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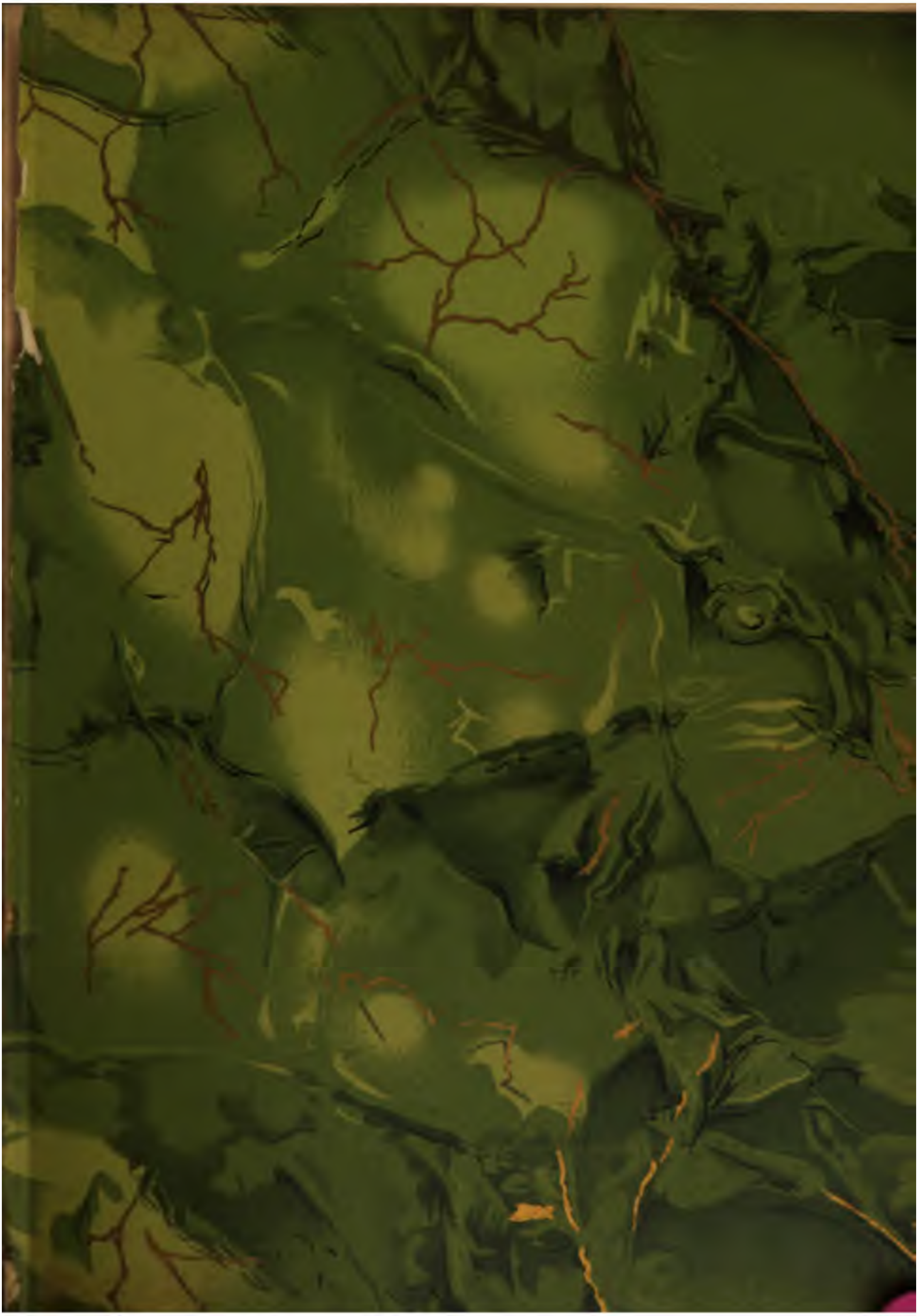

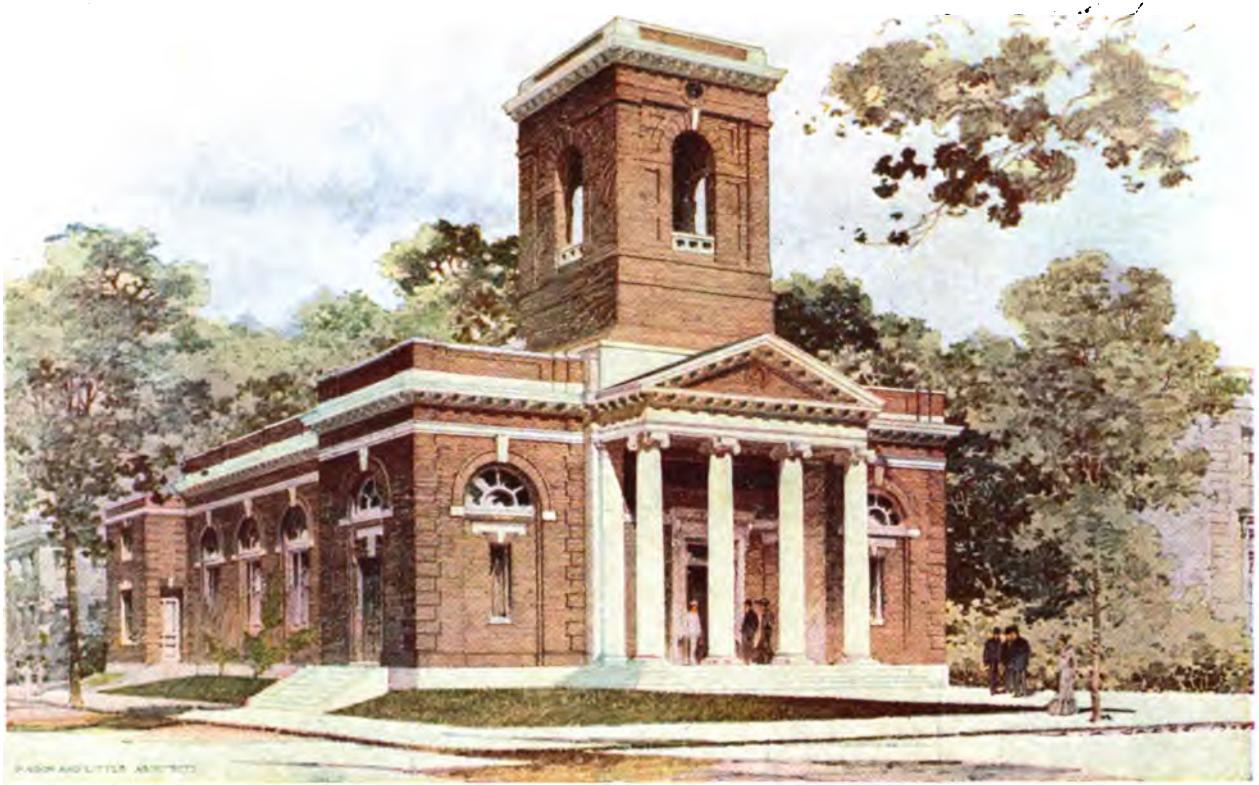

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Purdon & Little, Architects, Boston, Mass. For plan, see next succeeding plate.

Cyclopedia
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A General Reference Work on

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Grateful acknowledgment is here made also for the invaluable co-operation of the foremost architects, engineers, and builders in making these volumes thoroughly representative of the very best and latest practice in the design and construction of buildings; also for the valuable drawings and data, suggestions, criticisms, and other courtesies.

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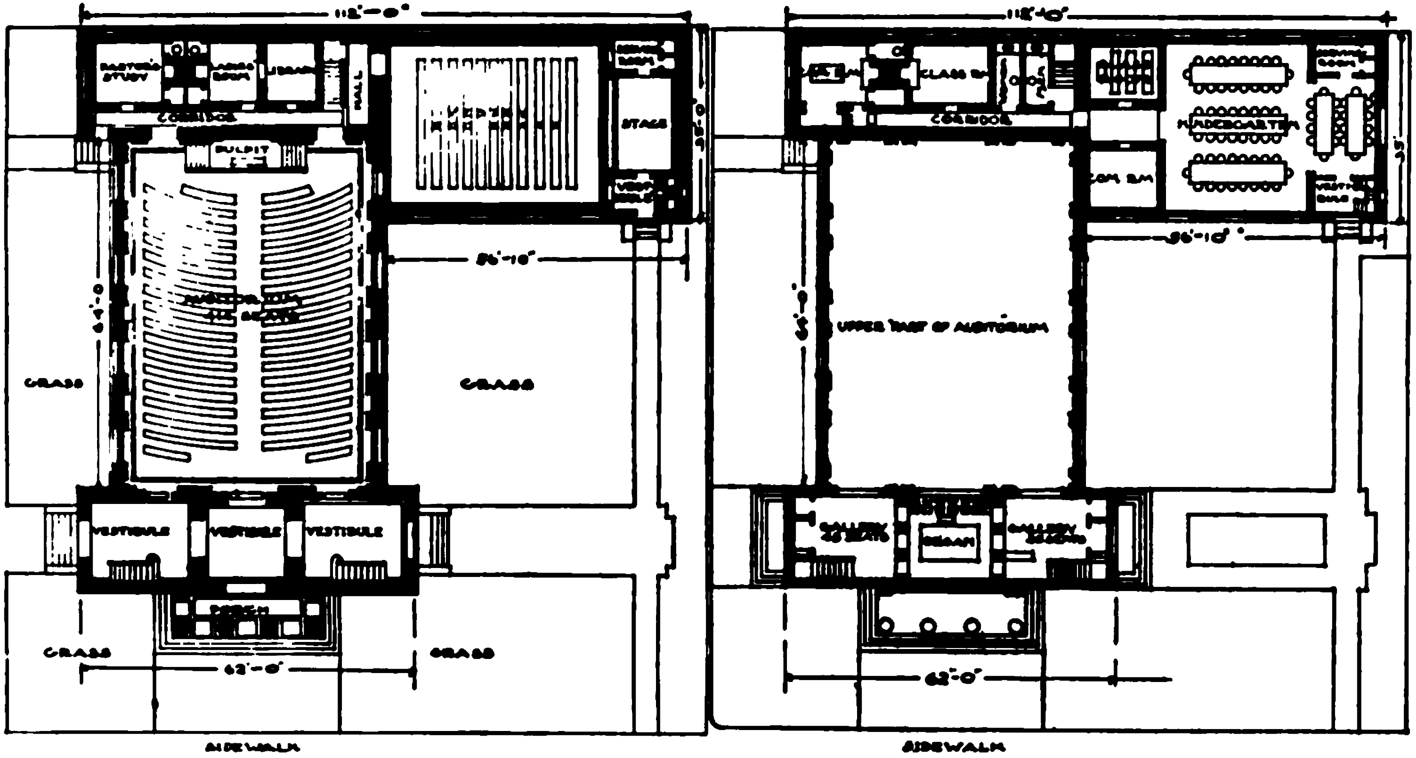

PLAN OF THE CHURCH OF THE DISCIPLES, BOSTON, MASS.

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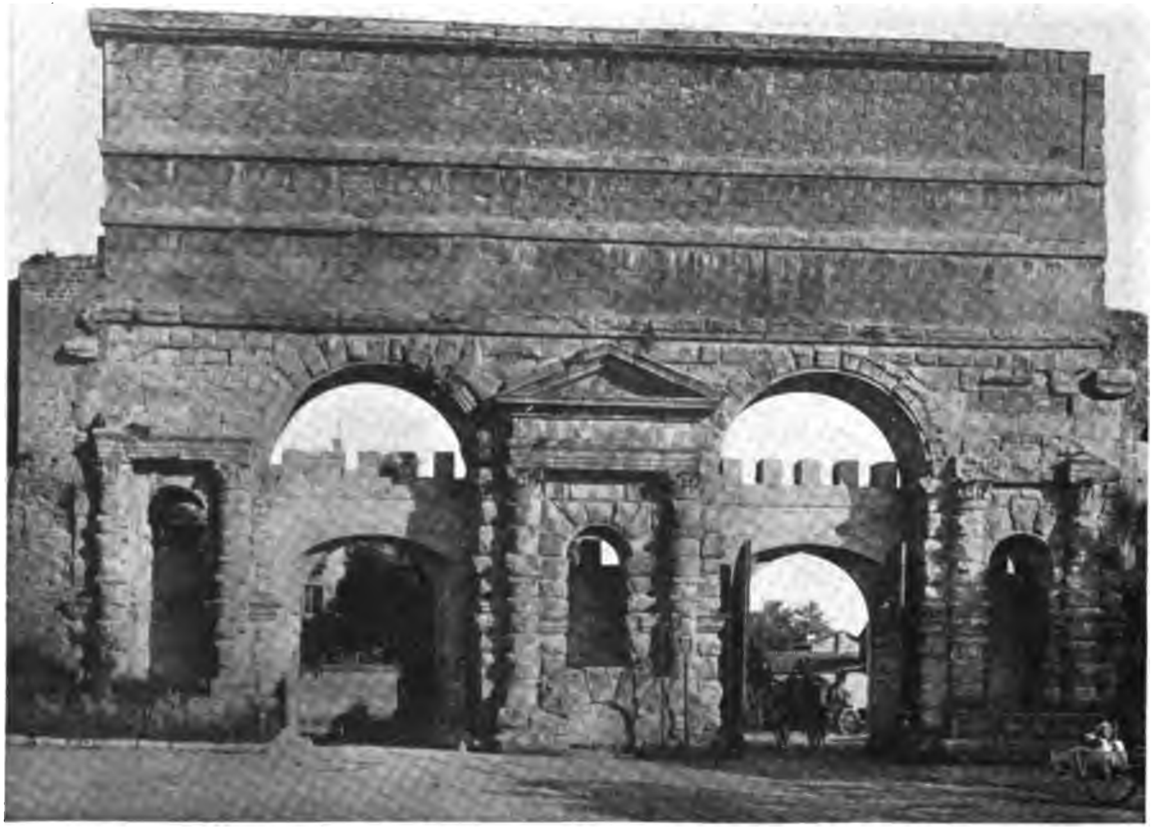

DETAILS OF PORTA MAGGIORE, AQUEDUCT DE CLAUDIUS, ROME, ITALY

Foreword

THE rapid evolution of constructive methods in recent years, as illustrated in the use of steel and concrete, and the increased size and complexity of buildings, has created the necessity for an authority which shall embody accumulated experience and approved practice along a variety of correlated lines. The Cyclopedia of Architecture, Carpentry, and Building is designed to fill this acknowledged need.

❡ There is no industry that compares with Building in the close interdependence of its subsidiary trades. The Architect, for example, who knows nothing of Steel or Concrete construction is today as much out of place on important work as the Contractor who cannot make intelligent estimates, or who understands nothing of his legal rights and responsibilities. A carpenter must now know something of Masonry, Electric Wiring, and, in fact, all other trades employed in the erection of a building; and the same is true of all the craftsmen whose handiwork will enter into the completed structure.

❡ Neither pains nor expense have been spared to make the present work the most comprehensive and authoritative on the subject of Building and its allied industries. The aim has been, not merely to create a work which will appeal to the trained expert, but one that will commend itself also to the beginner and the self-taught, practical man by giving him a working knowledge of the principles and methods, not only of his own particular trade, but of all other branches of the Building Industry as well. The various sections have been prepared especially for home study, each written by an acknowledged authority on the subject. The arrangement of matter is such as to carry the student forward by easy stages. Series of review questions are inserted in each volume, enabling the reader to test his knowledge and make it a permanent possession. The illustrations have been selected with unusual care to elucidate the text.

¶ The work will be found to cover many important topics on which little information has heretofore been available. This is especially apparent in such sections as those on Steel Construction; Reinforced Concrete Construction; Building Superintendence; Estimating; Contracts and Specifications, including the principles and methods of awarding and executing Government contracts; and Building Law.

¶ In conclusion, grateful acknowledgment is due the staff of authors and collaborators, without whose hearty co-operation this work would have been impossible.

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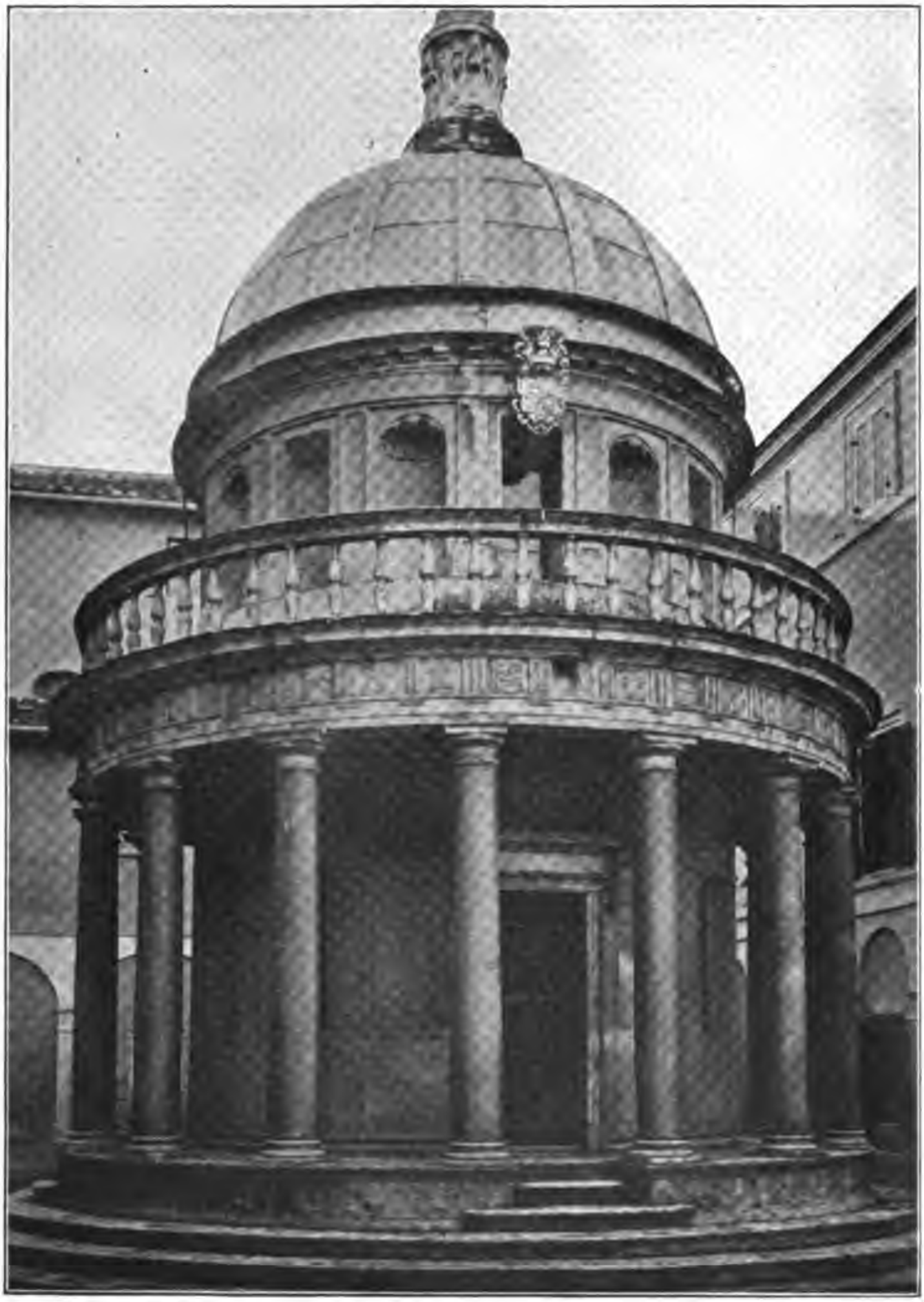


Circular Temple in Courtyard of San Pietro, Montorio, Rome; Donato d'Angnolo Bramante, Architect
Showing Renaissance use of Doric Order in a circular temple with domed lantern above.

STUDY OF THE ORDERS

PART I

THE RENAISSANCE ROMAN ORDERS

Introduction. This section on the Roman Orders is largely an adaptation and simplification of a work published in 1870 entitled "An Analysis of the Five Orders" by F. Laureys, architect, and professor at the Royal Academy and Industrial School of Brussels. Professor Laureys has taken the standard orders as shown in the plates from the better known work by Vignola, and has further elaborated their system of construction. He has explained in detail many parts of the plates and orders of Vignola, which that authority has left vague or indeterminate, and has generally succeeded in attaining a more distinctive type-form in the instances where he has chosen to deviate from the original. The three order plates from Vignola may be considered as "key-plates" showing the proper relation of the more detailed drawings adapted from the elaborate system of Professor Laureys, and the proper assemblage of the different parts of the order in such a manner as to give a comprehensive idea of the whole.

The included plates from Palladio furnish alternative versions of each of the three orders and are valuable as showing in many instances the authority for the changes which Professor Laureys has chosen to make from Vignola. Vignola and Palladio were practically contemporaneous Italian architects living in the sixteenth century, the first -possibly better described as a thinker and analytic theorist residing in Rome; while Palladio worked in the north of Italy and, either through better opportunity or a differing temperament, has amply proved by his practices the value of his works.

It must be understood that these so-called Roman orders are not the orders used by the Classic Roman builders in any instance, but are versions made in the sixteenth century from the then-existing buildings and remains of Roman work, and each of these orders was intended to become a "type-form," or composite of the best features of the varying ancient examples. They are, therefore, more distinctively products of the Renaissance and might more appropriately be termed the Renaissance Classic orders, but in contradistinction to the still earlier and radically different creations of artistic Greek workmen, these examples are known as the Roman orders. Indeed, however much they may differ in detail from the Roman originals, they are carried out in as close an approximation to the spirit of Roman work as would be possible at any later date, but differ radically from the spirit and intent of the preceding Greek work, upon which the Romans had in turn founded and developed their application and use of the orders.

Some buildings are the logical outcome of the needs they are designed to serve, or of the nature of the materials used in them; others have been evolved by the artistic genius of different peoples, and have gradually been perfected in the advance and progress of civilization and art. Such buildings possess an æsthetic or artistic character, and are the natural expression of particular peoples at a given stage of their civilization.

The Greeks and the Romans, the most cultivated nations of ancient times, brought their architectural forms to a very high degree of perfection. The destruction of ancient civilization by the Fall of the Roman Empire in the 5th century A. D. and the spread of Christianity, caused the complete disappearance of Greek and Roman architecture during several centuries. This period is called the Middle Ages and lasted until the 15th century, but during this time a new civilization was developing and producing an architecture, which in certain countries (notably in France) attained a very high degree of perfection.

In the 15th century, however, the study of ancient literature brought about an intellectual reaction which led both science and art into sympathy with Greco-Roman antiquity. Architecture then discarded the artistic forms of the Middle Ages and adopted new forms derived from the remains of ancient Rome. This period was called the Renaissance, and from it we may date the academic study of architecture, based on the architecture of Greece and of Rome To the architectural style at this time adopted as a standard for study in the classroom, has been given the designation "Classical," and as the principles of classical architecture are the easiest to formulate and retain, it is most helpful to begin with the study of these. An accurate knowledge of classical architecture is essential to the study of all other styles.

1. Architecture is the art of designing and constructing buildings.

2. The designing of buildings consists in a graphic (or plastic) representation of their intended shapes and sizes.

3. An architect uses mechanical drawing to express his ideas and to record exactly the size and shape of the object represented.

4. In mechanical drawing, the instruments used to draw the straight lines and the curves which express the forms of objects, are, among others, the straight edge, triangle and compass.

5. In general, full straight lines indicate visible edges, and broken or dotted lines indicate relations of different parts, such as the axis or center-line of a street or building or the distance covered by a figured measurement.

6. Horizontal lines are drawn along a T-square whose head rests against the left side of a drawing board. Vertical and sloping lines are drawn against a triangle resting against the T-square. (Fig. 1).

7. Two horizontal lines intersecting two vertical lines, all of equal length, form a square. If its opposite corners are connected by straight lines, called diagonals, the intersection of these diagonals gives the center of the square. A horizontal and a vertical line may be drawn through this center, and then, by setting the point of the compass at the center and opening the compass along either of these lines to the sides of the square, a circle may be

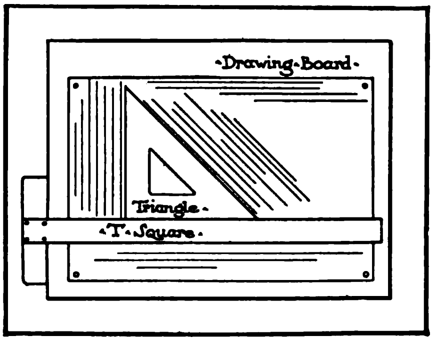


Fig. 1.

drawn which will be exactly inscribed within the square. The square itself will be divided into four small squares, each of which contains a quadrant or quarter circle. (C, plan, Fig. 2.)

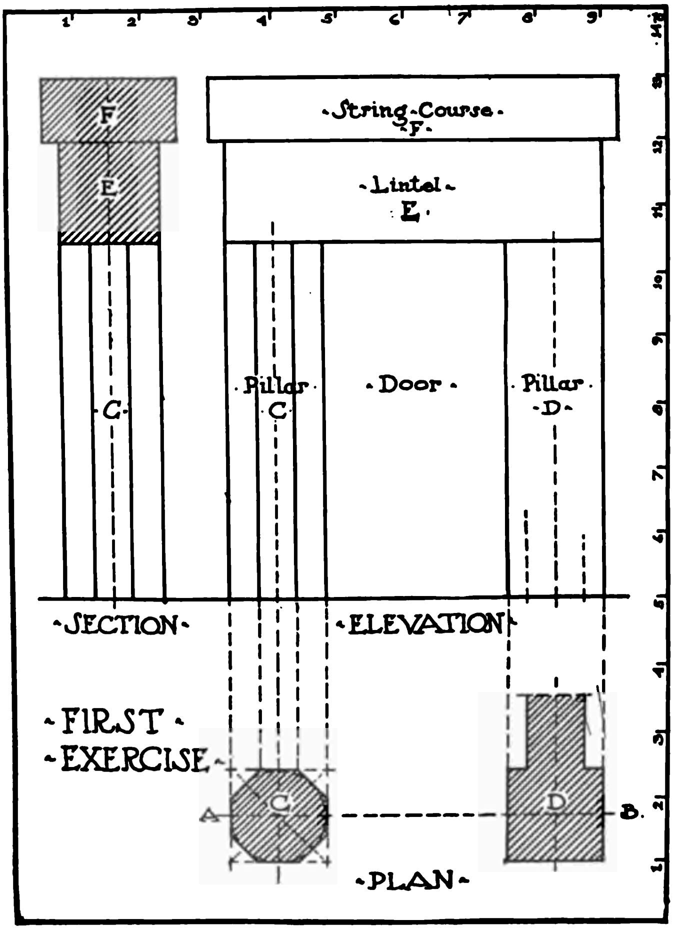


Fig. 2.

8. The circle is divided into 360 parts, which are used for measuring angles or the difference in direction between any two lines that meet in the center of the circle. For convenience, an instrument called a protractor is sometimes used, which consists of a half-circle divided into 180 parts called degrees (°). A vertical line from the center of the circle will cut the curve or circumference at a point 90° above the horizontal, and the diagonals of the square in which the circle is inscribed will divide each angle of 90° into two angles of 45° each.

9. As it is impracticable to draw many objects at their full size, an arbitrary scale is used to enable the drawing to be made at $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{16}$, $\frac{1}{32}$, or some other fraction of its true size. Drawings at the scale of $\frac{1}{4}$ inch to the foot reproduce each dimension of an object at $\frac{1}{48}$ of its true size. The system of drawing things "to scale" enables us to make accurate drawings at any convenient size.

10. To make pictures of objects in such a way as to express accurately the size and shape of every part, three drawings are usually necessary—a plan, a section, and an elevation—the plan to show widths and lengths, the section to show widths and heights, the elevation to show lengths and heights.

11. A drawing looks better when its perpendicular center is half-way across the paper and its bulk placed slightly above the horizontal center of the sheet. Begin then by finding a point in the paper half-way between the sides, and through this center draw a vertical line—the vertical axis of the drawing. Lay out the plan, the elevation, or the sum of the two together with the space between them, so that half the finished work shall be on each side of the vertical axis.

12. In mechanical drawing, it is best to begin by indicating the axes or center lines of objects in plan, section and elevation. On either side of these axes lay out one-half of the width or depth of the objects represented.

13. A pier or pillar is a mass of stone, wood or metal standing on end and used as a support. (Fig. 2, C.)

14. A lintel is a piece of stone, timber, or metal laid flat upon two pillars so as to form an opening or bay. (Fig. 2, E.)

15. A string course is a horizontal band of stone, brick, or other building material projecting beyond the face of a wall. (Fig. 2, F.)

16. The first exercise, Fig. 2, shows two pillars C and D, carrying a lintel E, above which is a string course F. The plan shows the width and the depth of the pillars C and D. It shows that pillar D is square and that pillar C is eight sided (octagonal.)

It also shows that these two pillars are set along a straight line or axis (A-B) having the same direction as two of their sides. The section shows the vertical position, the depth and the height of the pillars, the width and the height of the lintel E, which rests on the pillars so as to line with their face; and last of all the height and the width of the string course F, with its projection beyond the lintel E. The elevation shows the general arrangement of pillars and lintel as seen from an arbitrary viewpoint directly in front. It shows that the two pillars are upright or plumb, indicates the shape of the space between, and gives the length of the lintel and of the string course.

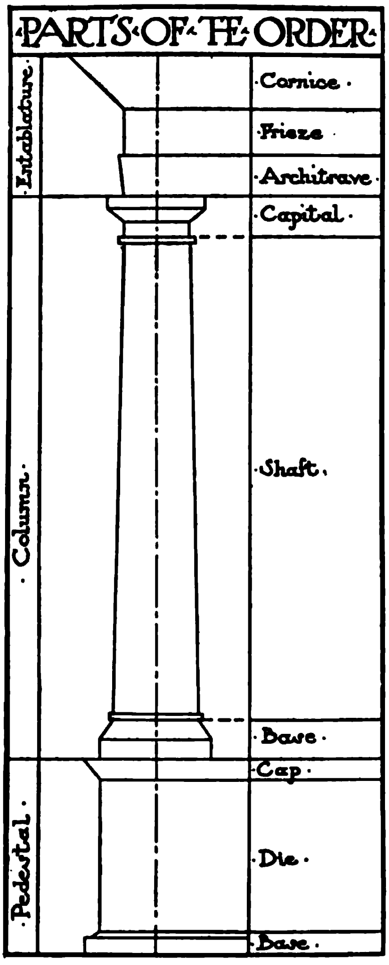


Fig. 3.

17. All the parts of this drawing have definite relations of size which are called proportions. Each pillar is one unit and a-half wide, one unit and a-half deep and five units and a-half high. The space between the pillars is two and three-quarter units wide and five and one-half high; its width is, therefore, one-half its height.

18. When a pillar is cylindrical or rounded, it is called a column and is divided into parts, the major part being termed the shaft. (Fig. 3). The shaft is the portion extending between the base and the capital, or between the capital and the support upon which the column rests. The shaft generally rests upon a projecting block or base included as part of the column, and is crowned with another projection called a capital.

19. Columns are connected to one another overhead by a timber or stone called the architrave. Generally there is above the architrave a plain space, called the frieze, lining with the neck of the column below, and above the frieze a projecting mass that completes the whole and is called the cornice. The architrave, frieze, and cornice taken together are called the entablature. A column with an entablature constitute an Order of Architecture.

20. Sometimes an Order of Architecture is set upon a mass of a certain height which is called the pedestal. The pedestal often has a base, and a cornice or crowning member called a cap. The space between the base and the cap is called the die of the pedestal.

21. There are sometimes used at the corners of buildings, or elsewhere against a wall, flat pillars having, like the column, a base and a capital. These pillars are called pilasters.

22. For the sake of elegance and lightness, the shafts of columns and pilasters are generally made smaller at the top than at the bottom. This prevents the shafts from appearing clumsy. They do not, however, taper all the way from the base upward, but only from a point one-third the height of the shaft above the base. Above this point the outline of a column or pilaster shaft is a gentle tapering curve. This swelling curve or taper is called the "entasis" of the column.

23. It must be noted that the diminution of the pilaster is much less than that of the column, and that in some cases the pilaster is of the same width at the neck as at the base. As specifically shown hereafter, there are certain relations between the necks and bases of columns and pilasters of each of the Orders. Occasionally, where a pilaster is used alone upon the corner of a building and not in immediate association with a tapered column, the pilaster shaft is, for obvious reasons, of the same width at the neck as at the base. See plates XXVII and XXVIII.

24. When square pillars carry vaults or arches instead of lintels, the pillars are called piers (Fig. 4). If a support is square or oblong in plan, and its thickness in relation to its height is considerably more than the thickness of a column, it is called a pier even though it carries a lintel. When a pier is topped by a projecting stone or series of mouldings from which an arch springs, this projection is called the impost, and the projecting band or border that is often placed around the edge of the arch is called an archivolt. Piers generally rest upon a base or plinth.

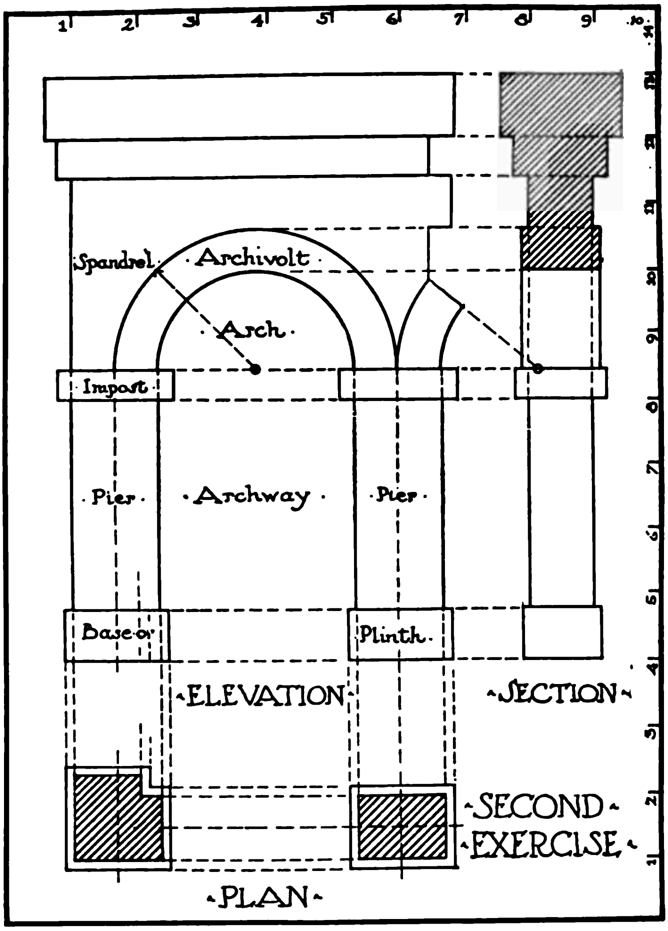


Fig. 4.

25. An arch is a support constructed of separate stones, units, or voussoirs, with its center higher than its two ends, and of an outline which is, in part or entirely, a circle, or a curve laid out from one or more centers. A vault is a continuous arch roofing over a room or passage, whose length is considerably greater than its width. A series of arches in succession opening upon the space covered by a vault, may be called an arcade.

26. Note the distinction between the lintel, a single horizontal member carrying a superimposed weight to the piers by its own strength, and the arch, a curved construction which carries a superincumbent weight by transferring its load to the piers or supports from which it springs, but unlike the lintel, adding a certain lateral "thrust" which the supports must resist.

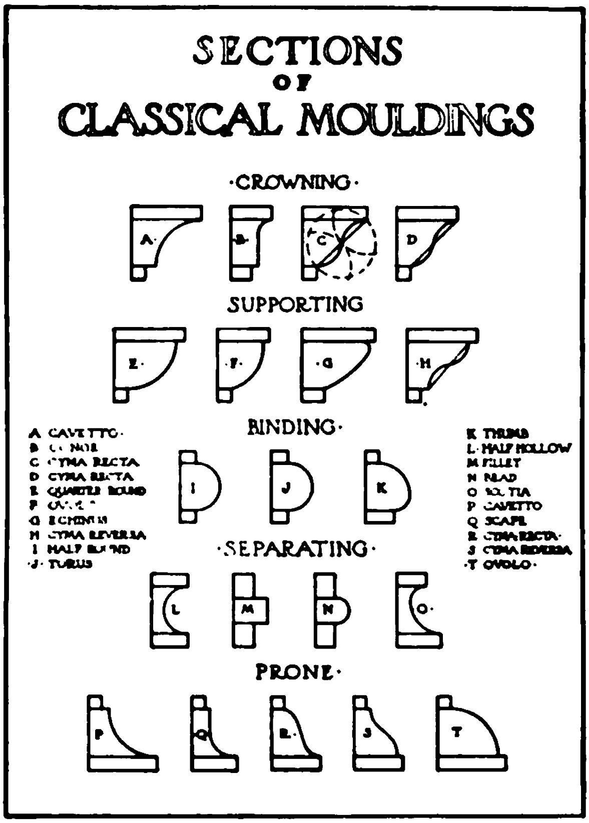


Fig. 5.

27. Bases, capitals, lintels, cornices, imposts, and archivolts are composed of separate members of straight or curved profiles, and these members are called mouldings.

28. Classical mouldings may be divided into five classes: crowning, supporting, binding, separating and prone. The mouldings most frequently used are the quarter round, Fig. 5 (E); the cove or cavetto, (A); the torus or half round, (J); the cyma, (C);

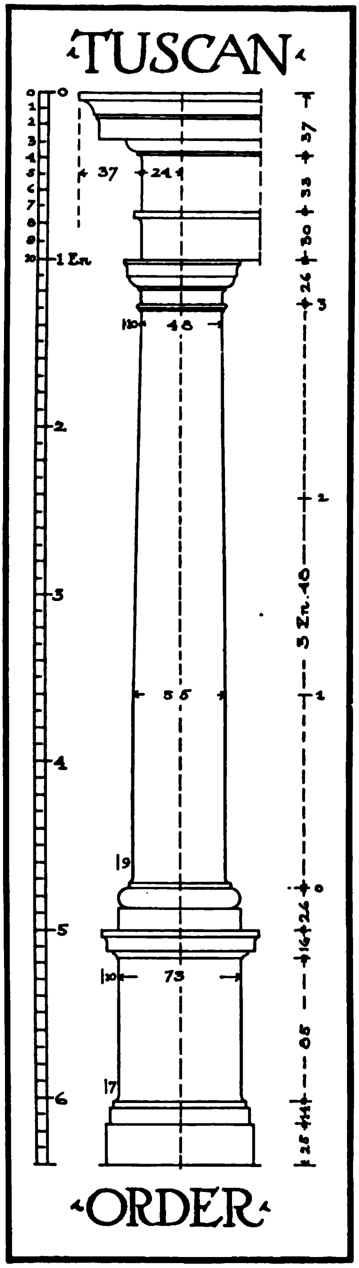


Fig. 6.

the ogee or cyma reversa, (H); and the scotia, (O). The quarter round, cove and torus are simple mouldings whose outline is an arc of a circle; the cyma, ogee and scotia are composite mouldings outlined by the arcs of two or more circles. The fillet (M), while never occupying an important position, is continually used to finish off or to separate the more important mouldings.

29. Classical architecture includes five Orders that differ in the proportions of their columns and in richness of their ornamentation. These Orders have long been called the Tuscan Order, (Fig. 6); Doric Order, Ionic Order, and Corinthian Order, (Plate I) and Composite Order, (Fig. 17). The Doric, Ionic and Corinthian orders are the most important, as they are now in more general use.

30. The five orders have one proportion in common, viz.: the relation of the height of the column to the height of the entablature. The entablature in all five orders is one quarter the column height. The height of the column in any order is therefore the height of four entablatures, and the height of the entablature, although a variable quantity, will always bear a certain relation to the general height of the order.

31. The height of the entablature divided into one hundred

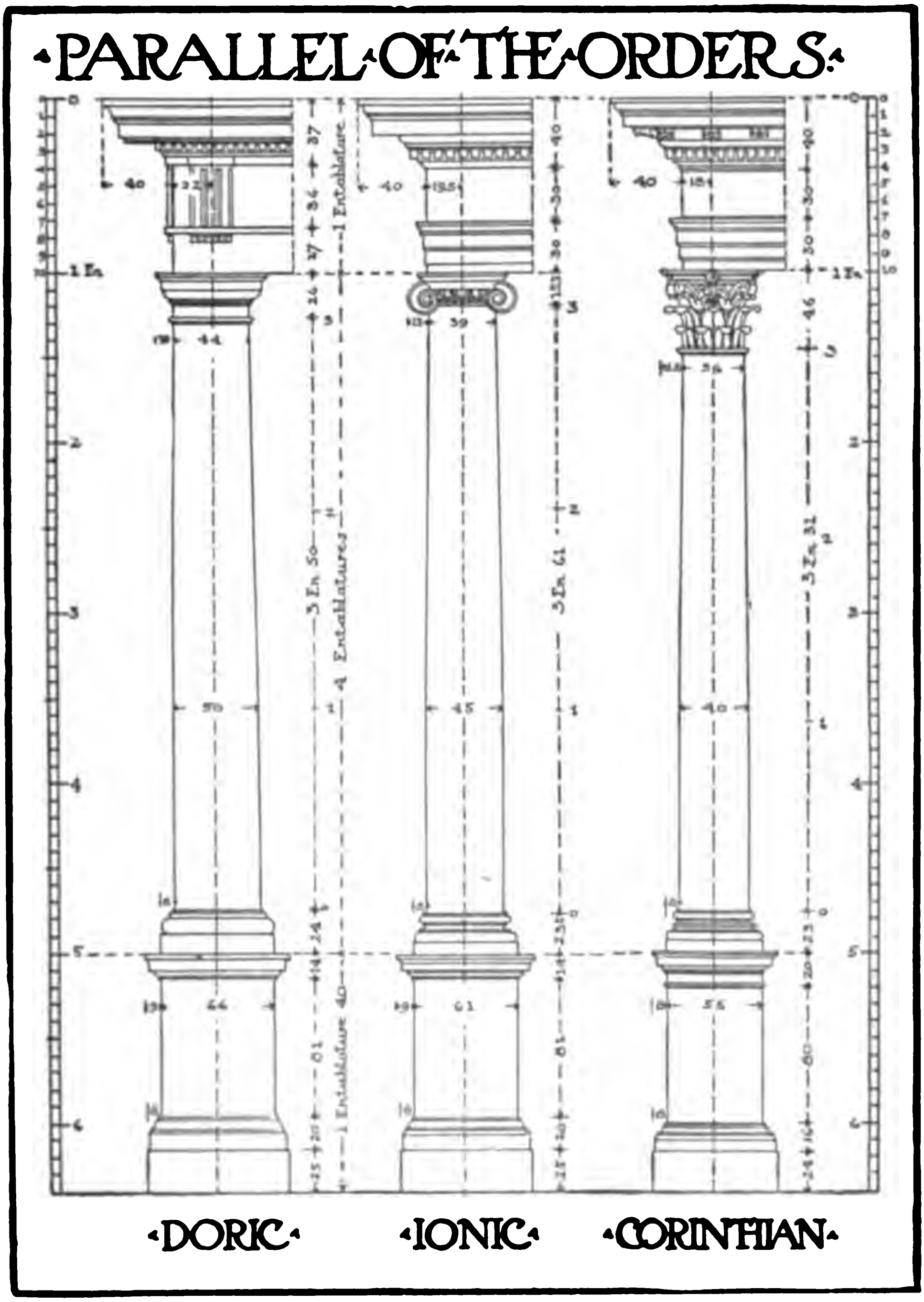


PLATE I.

(A reproduction at small size of Portfolio Plate I.)

parts establishes a scale which may be used in determining the proper proportions of all parts of the order. This scale unit is called the Entablature or "En" and its one hundred parts are, where necessary to show more minute divisions, sub-divided into tenths which are expressed decimally.

32. Another system of measurements which is often used is based upon a unit called the "Module" which is always equal to the radius of the column shaft at the base. This unit, like the "En," may vary in different examples but will always have a definite relation to the order as a whole in any particular case. The "Module" is sometimes subdivided into twelve parts, sometimes into eighteen and sometimes into thirty, depending upon the order considered and the system of measurement to be adopted. It is, therefore, not so reliable a unit as the "En," and the latter will be used in this work. Some of the plates from Vignola and Palladio, however, are drawn according to the "Module" system. It is only necessary to remember that the "Module" is always equal to the semi-diameter at the base of the column.

33. The figured dimensions of a drawing are written along vertical lines in measuring heights, and along horizontal lines in measuring widths. A figured drawing is one whose dimensions are expressed in figures, and the extent covered by each measurement is denoted by dotted measuring lines and by spurs or arrow heads, two of which when meeting form a cross.

34. The most striking difference between the Orders is in the proportions of the columns, whose heights, as already noted, are equal to four entablatures, but whose diameters just above the bases are as follows:

Tuscan order,	55	parts	of the	Entablature	or "En."
Doric order,	50	"	"	"	"
Ionic order,	45	"	"	"	"
Corinthian order	40	"	"	"	"
Composite order	40	"	"	"	"

From the Tuscan to the Corinthian Order the thickness of the column decreases evenly by five parts at each step.

35. The shafts of columns, as we have already seen, are less thick at the capital than at the base. The upper diameter of the columns of the different orders is: for the—

Tuscan	Order,	48 parts.
Doric	"	44 "
Ionic	"	39 "
Corinthian	"	36 "
Composite	"	36 "

36. The Tuscan and Doric columns have one relation in common,—the height of their capitals, which is twenty-six. The cornice in both these orders has a height of thirty-seven.

37. The entablatures of the Ionic, Corinthian and Composite orders have certain general proportions in common, and all the general proportions of Corinthian and Composite columns are identical.

38. When orders are set upon pedestals, the latter must harmonize in their proportions and decoration with the orders carried by them. The height, however, is variable, being generally prescribed by the practical requirements of each building. A good average height is 1 En 40 parts or 140 parts. Although pedestals are not component parts of the orders it is convenient to call them according to their characteristics, Tuscan pedestals, Doric pedestals, Ionic pedestals, etc., as the case may be. The several orders differ in the complexity of their mouldings and the richness of their ornamentation.

TUSCAN ORDER.

39. Although it has been deemed best to restrict this textbook to a consideration of the three Roman orders termed the Doric, Ionic and Corinthian, the simpler Tuscan Order is shown sufficiently in detail to enable the student to use it in the exercises as required. The simplicity of its mouldings and the comparatively few lines required to express its component parts seem especially to fit this order for the earlier required drawings. The general proportions of the Tuscan Order are shown in Fig. 6, while the details may be more carefully studied in the full page drawing, Plate II

40. The shaft of the column has at its lower extremity a projecting member called the listel, surmounted by a curved member called the congé or cove, which is itself a continuation of the outline of the column shaft. The listel rests directly upon the

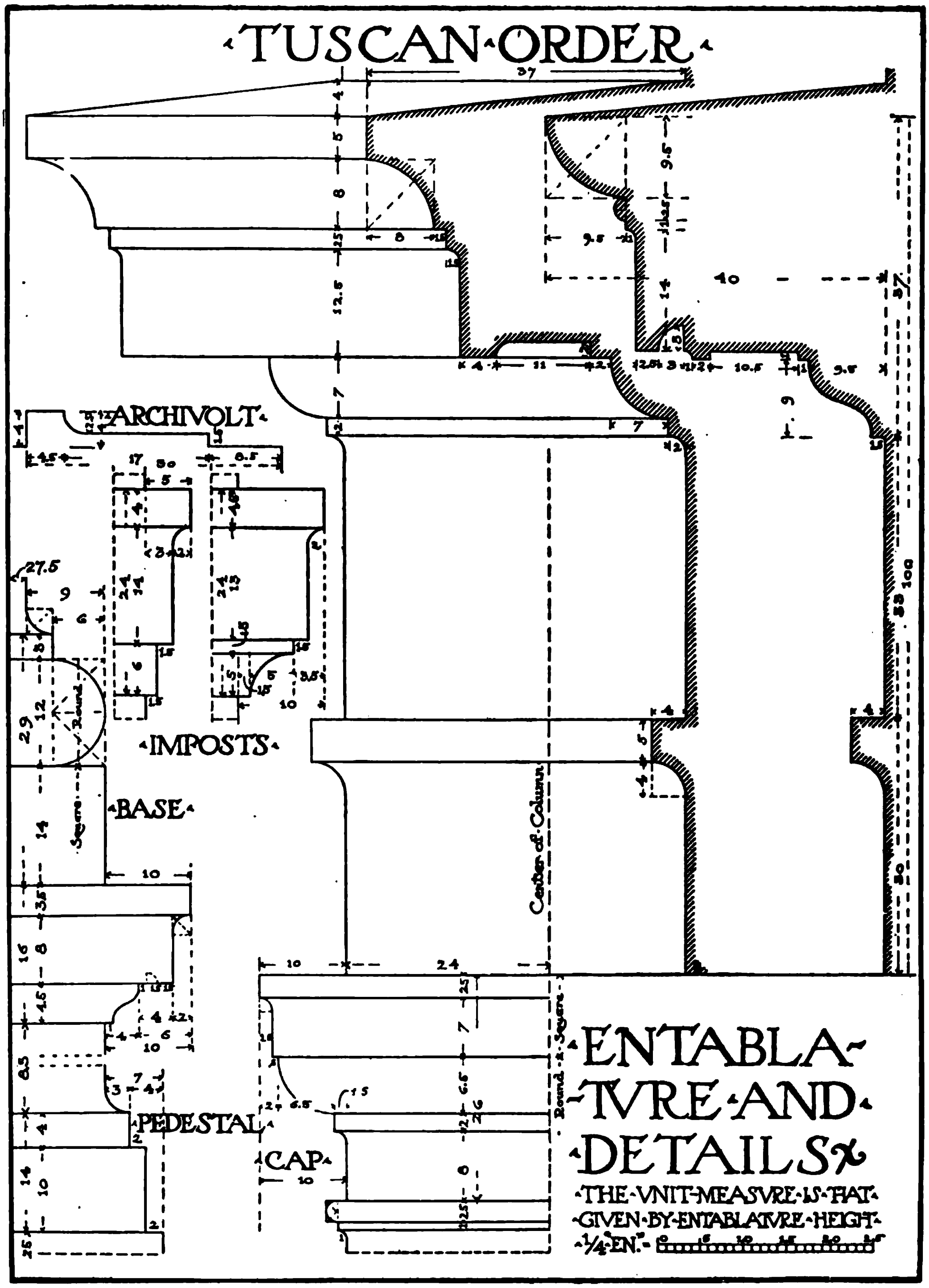


PLATE II.

(A reproduction at small size of Portfolio Plate II.)

base and is three parts in height and the same in projection, therefore the surmounting congé is in outline just a quarter of a circle.

41. The height of the base without the listel is 26 parts, divided between the plinth, which is 14 and the torus which is 12. Since a torus has the form of a semi-circle, its projection is one-half the height, that is to say six, which—with the projection of the listel—makes the total projection of the base beyond the lower part of the shaft nine parts.

42. The projection of the base determines the width of the die of the pedestal whose face corresponds to the face of the plinth above, and it is from this face that the projections of its cap and base are measured. These projections and moulding sections are shown at the left of the drawing in Plate II.

43. The shaft of the column is terminated below the capital by a moulding composed of a congé, a fillet, and a small torus which is called a bead; these mouldings taken together are termed the astragal.

44. The Tuscan capital is very simple, and is composed of three principal parts. Above the astragal occurs the necking, 8 parts in height and ending in a congé. Then comes a fillet 2 parts high. Above this is the quarter-round 6.5 parts in height and of equal projection. The upper part of the capital is composed of the abacus, ending in a congé and fillet, the whole 9.5 parts high. The abacus is, like the plinth of the base, square in plan. The total projection of the upper edge of the abacus from the face of the necking is 10 parts.

45. The architrave is composed of a single face, terminated by a cove and a listel. The total height of the architrave is thirty parts, of which twenty-five are given to the face and cove, and five to the listel. The projection of the listel is four parts.

46. The frieze of the Tuscan Order is thirty-three parts in height, and is terminated at the top by a congé.

47. The cornice is composed of three principal parts: the quarter-round, the corona and the cavetto. To each of these parts is also given a fillet or listel to finish or separate it from the adjacent mouldings. An alternative entablature is shown upon the same plate, lining with the one just described.

48. On this plate (II) are also shown the details of two imposts and an archivolt which may be employed in the decorated arcades of the Tuscan Order. The imposts are twenty-four parts in height, and the archivolt is thirty parts wide.

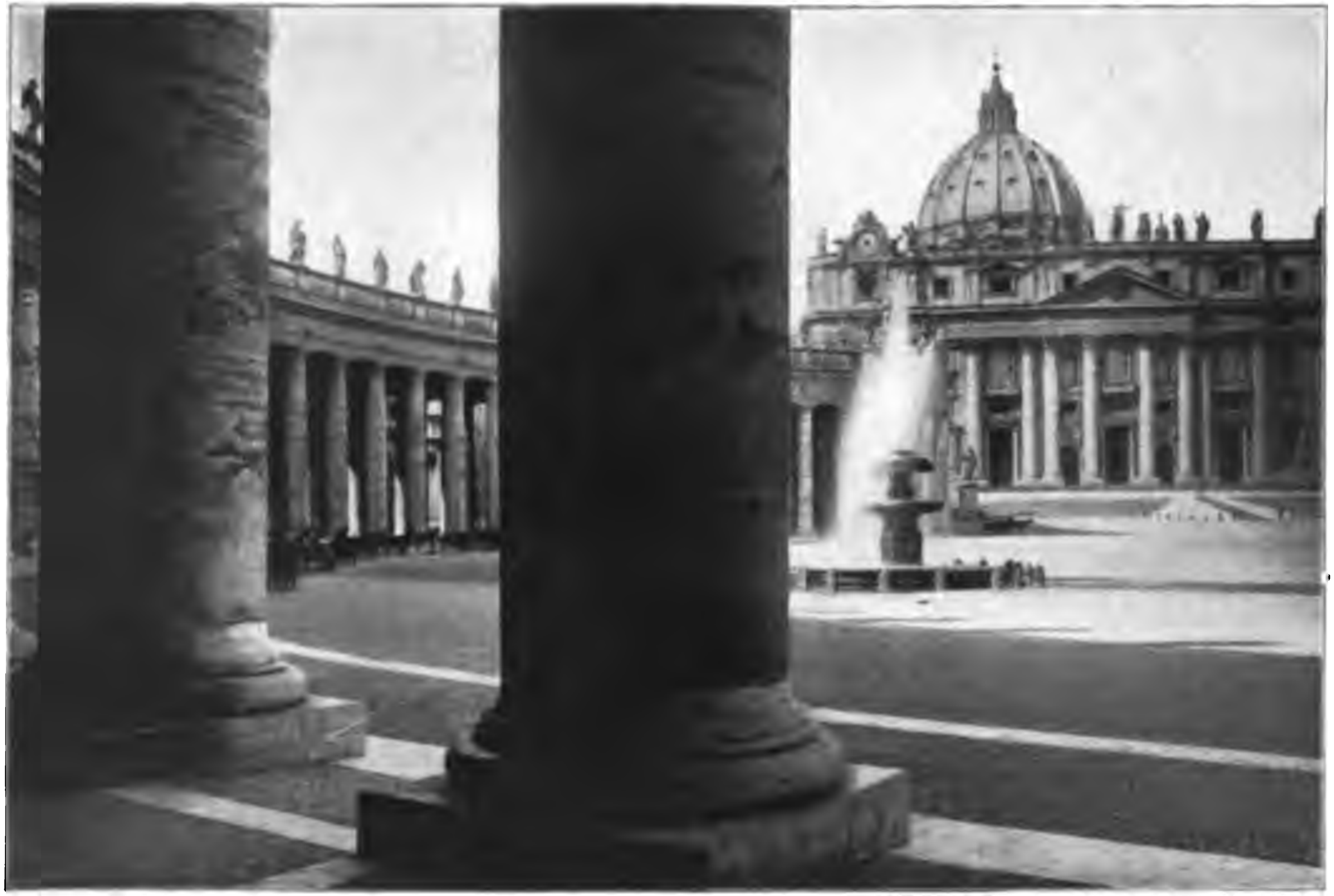
DORIC ORDER.

49. There are two styles of the Doric Order, the Denticular Order and the Mutular Order. The difference between these two styles is purely decorative and will be explained in the course of this analysis.

50. The Doric column, more elegant than that of the Tuscan Order, is sometimes fluted with segmental channels, the intersection of which forms a sharp raised edge or "arris." These channels are always twenty in number, and are so placed that one is always seen in the center of the column on each of its four faces.

51. To draw a column with channels, it is necessary to make a plan just above the base, that is to say, at its greatest diameter, and another at its smallest diameter or at the necking of the column. (Plate III.) Having divided the semi-circumference into twenty different parts, and having determined the radius through each point of division, draw a chord of the arc comprising two of these divisions; and with an opening of the compass equal to one-half of this chord, and from the point where it intersects the radius which divides it into two parts, draw a semi-circle outside of the circumference of the column. The summit of this semi-circle will be the center of the arc of the circle that forms the channel. By taking the corresponding point on each alternate radius all the channels may be drawn with the same opening of the compass. As a result of this method, the arc of the Doric channel is exactly a quarter circle.

52. The head or upper part of each channel is a semi-circle, while the foot rests on a plane inclined at forty-five degrees. In drawing a channeled column there is but one channel seen in direct front elevation, the others follow the curvature of the shaft, and are drawn according to their positions on the plan. They form at the upper and lower extremities different curves which can be obtained only by projecting the proper points.



VIEW OF THE "PIAZZA" IN FRONT OF ST. PETER'S, ROME, ITALY

The Portico or Atrium was Built in 1659-67 by Lorenzo Bernini. The Dome of St. Peter's was Designed Principally by Michelangelo. The "Tasteless Façade" (Hamlin) was Designed by C. Maderna in 1606

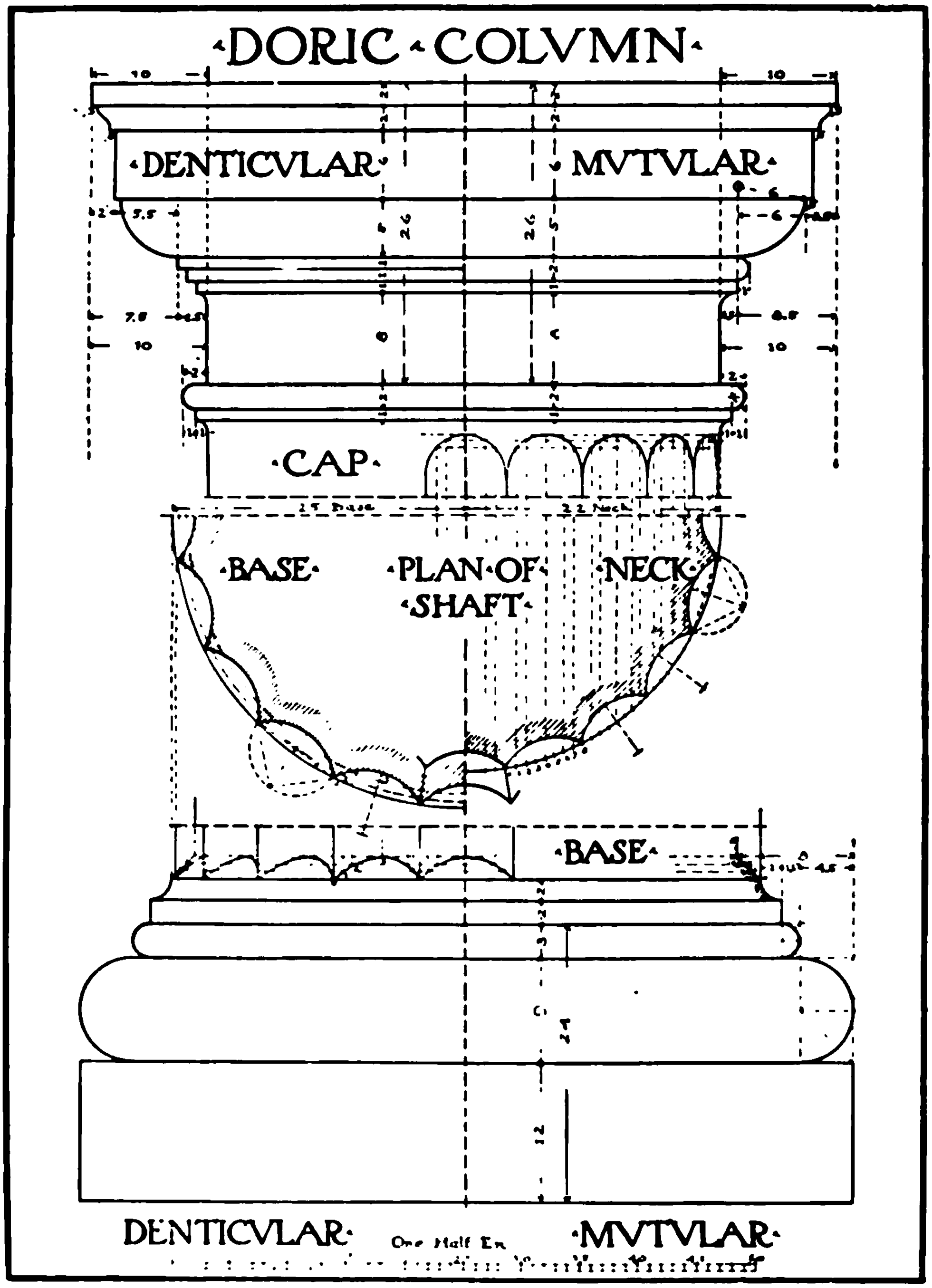


PLATE III.

(A reproduction at small size of Portfolio Plate III.)

Thus, to obtain the curves formed by the heads of the channels draw (in elevation) the semi-circle forming the head of the central channel, and divide the plan of each one into eight equal parts. Now project upward the points of division on the plan of this central channel by vertical lines drawn to intersect the semi-circle in elevation. From these points of intersection, draw horizontals which will pass through all the other channels. Then draw verticals from the plan of each channel, as has already been done with the central one, and at the intersection of these verticals with the respective horizontal lines, points of projection may be marked by means of which one may describe the various curves.

For the foot of the channels the section must be used to establish the points of projection by dividing the inclined plane into three equal parts, and from each of these points of division, horizontals passing through all the channels may be drawn; then, dividing the depth of the channel on the plan into three equal parts, one may draw from the center of the column, two circles passing through all the channels. At the points where these circles intersect the outlines of the several channels, points are found in plan which may be projected to the horizontals of the elevation. Through these points may be drawn the several curves of the channel footings.

53. This plate shows also the details of the capitals and bases of the two Doric Orders. The left half shows the Denticular and the right half the Mutular Order. The capitals have the general characteristics of the Tuscan capital, but they have several differences of detail. For example, the abacus is enriched by a small cyma-reversa with a listel or fillet; while the necking is separated from the quarter-round by three "annulets" in the denticular, and by an astragal in the mutular order.

The height of the Doric capital is the same as that of the Tuscan Order, twenty-six, divided thus: the necking eight, the annulets or astragal three, the quarter-round five, the abacus six, the cyma-reversa two, and the listel two; the total projection of these members is ten, of which two is the projection of the cyma-reversa, .5 is the projection of the abacus beyond the quarter-round, five for the quarter-round in the denticular order, and 2.5 for the three annulets

The quarter-round in the mutular order is of the same height as in the denticular but it has a projection of six, and is drawn with a radius of six, and the congé of the astragal has a projection of one and five-tenths. The shaft of the column terminates below the necking of the capital by an astragal of three parts, of which one is for the annulet, and two for the bead or ring; the congé has a projection of one.

Sometimes, in order to give increased richness to the capital, certain mouldings are carved. The cyma-reversa of the abacus is adorned with the leaf and tongue ornament, the quarter-round with eggs and darts, and the "baguette" or bead with beads and reels.

54. The Doric base is twenty-four parts in height, divided among the plinth of twelve, the torus of nine, and a bead or ring of three; the fillet below the congé of the column is two in height. The projection of the base is eight, comprising the congé of the column, which is two, the bead 1.5, and the torus 4.5.

55. The Doric entablatures are shown in Plates IV and V. The architraves have a characteristic ornament which consists of a row of small truncated cones (or pyramids) called "guttae," attached below the listel of the architrave to a small band called the reglet or taenia. Their position corresponds to the channeled parts of the frieze above, which are called the triglyphs. Notice that the denticular architrave is composed of a single band crowned by a listel, while the mutular has two bands, of which the upper projects beyond the one that rests upon the capital. These bands are designated by the name fascia or "facure."

Both styles of Doric architraves are twenty-seven parts in height, of which four are given to the listel.

The lower band of the mutular Doric architrave is nine parts in height; the height of the guttae is three, of the reglet or "taenia" one. The denticular style has but one projection, that of the listel, which is three. The mutular has a projection of four, because of the added projection of the second fascia which is one. The guttae are spaced four parts from center to center; their lower width is three and the upper width two. The face of the taenia is parallel to the slope of the guttae. The projection of the guttae from the face of the architrave is 2.5 on the bottom, and two at the top.

56. The frieze of the Doric Order is thirty-six parts in height

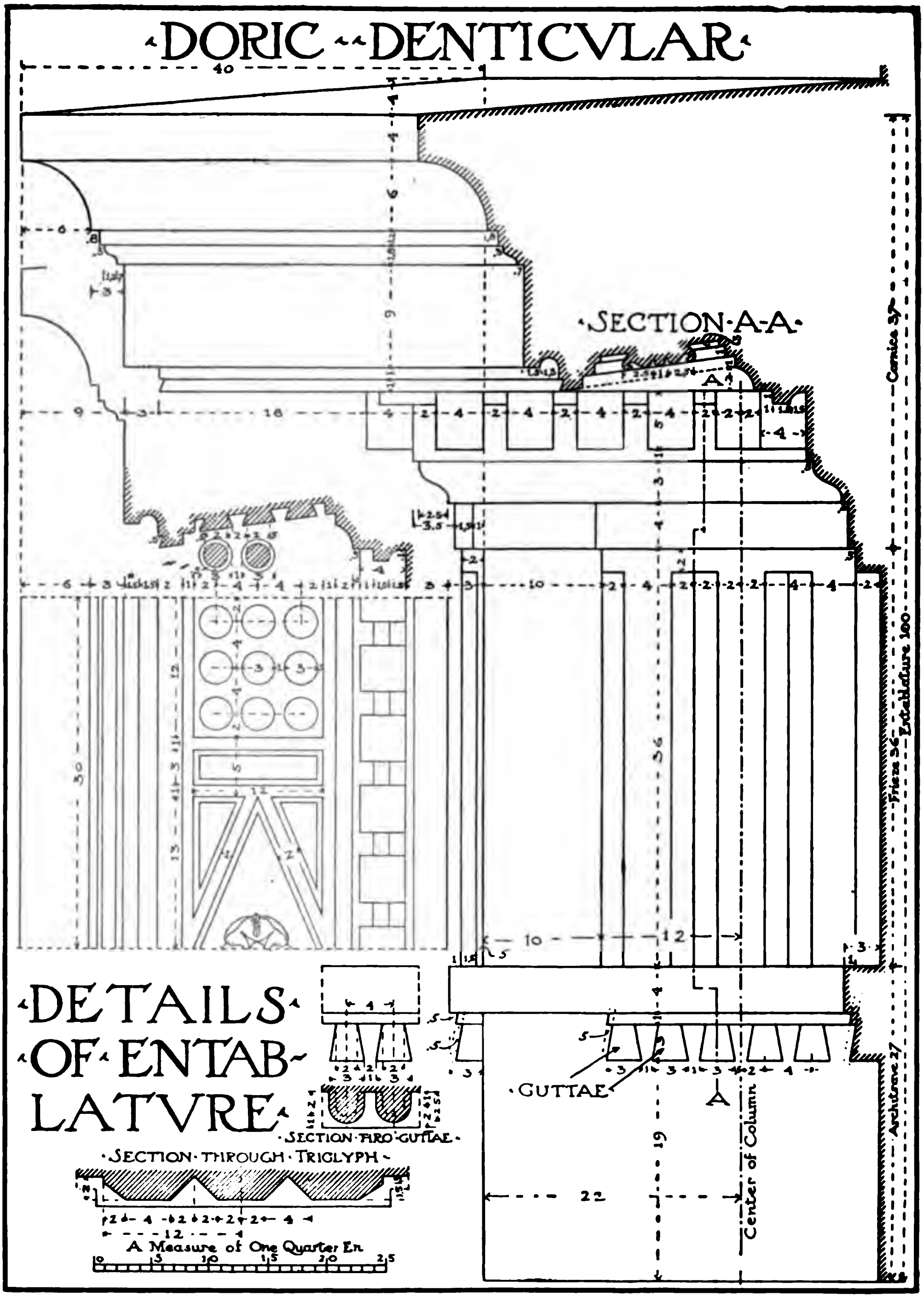


PLATE IV.
(A reproduction at small size of Portfolio Plate IV.)

and is distinguished by its triglyphs, which are apparently the extremities of beams, forming on the frieze a slight projection of two parts, and spaced at regular intervals. The name comes from the triangular channels with which they are ornamented. The detail of this ornament as well as of the dependant guttae is clearly shown in Fig. 7.

57. The cornice of the denticular Doric Order is thirty-seven parts in height and its projection is forty. It is composed first, of a band four parts in height and one in projection, forming a slight projection of .5 over each triglyph; second, a cyma-reversa of three in height and 2.5 in projection, placed with a projection of five-tenths over the head of the triglyph; third, a band six in height and five-tenths in projection over the cyma-reversa; against this band are placed small blocks, five parts in height and four in width, with a space of two between them, which are called dentils; fourth, a corona eleven parts in height comprising two fillets, of one part each which are seen in profile on the section AA and which, with the drip, are intended to carry off the rain water; fifth, a cyma-

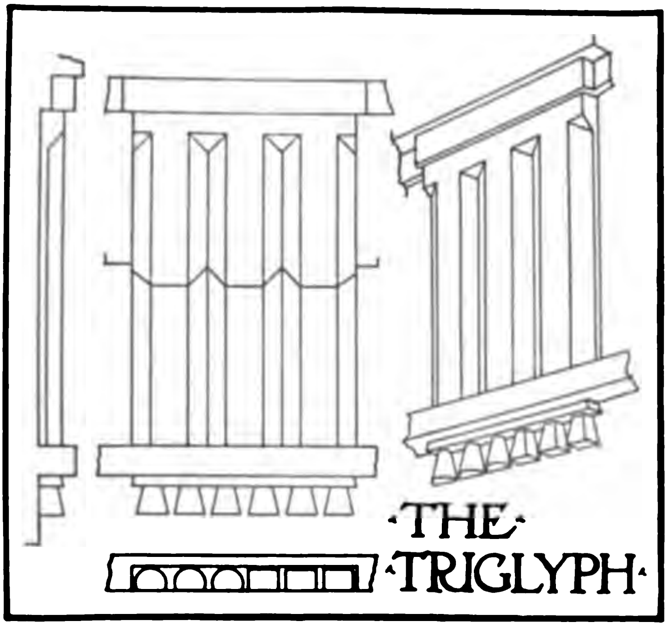


Fig. 7.

reversa of 1.8 surmounted by a fillet of 1.2 and the whole projecting 2.2; sixth, a cavetto of six, and six in projection; seventh, a listel of four crowning the cavetto.

58. The two sections show that the dentils are surmounted under the corona by a cavetto of two in height, having a projection of two in which is included the offsetting projection of .5. This cavetto causes the soffit or lower face of the corona to be inclined two parts. This soffit is divided into panels of various forms corresponding to the divisions of the frieze, as will be seen in Fig. 9. Those panels which correspond to the triglyphs are ornamented by round guttae, the position of which is determined by the edges of the channels. The guttae are three parts in diameter at the lower face and two at their summit; they are one in height and are placed in three rows spaced four from center to center. The other panels are divided into lozenges and triangles and are sometimes ornamented with rosettes or other devices.

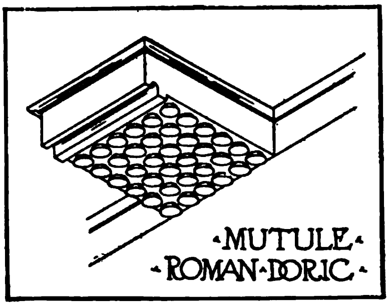


Fig. 8.

59. The frieze of the mutular order is distinguished only by a slight difference in the channels of the triglyph. The channels on the edges are eased off into a curve at the top, while the others form re-entering angles.

The cornice is noticeable for the projecting blocks which depend from the corona and which are called mutules (Fig. 8). This cornice (Plate V) has the same height as the preceding one (Plate IV), but it differs in its projection, which is forty-two. The height is divided in the following manner: the band above the triglyph four, the fillet 1.5, the quarter round three and five-tenths, mutules six and five-tenths, cyma-reversa one and five-tenths, the corona eight, cyma-reversa one and eight-tenths, fillet one and two-tenths, cyma-recta six, and the listel three. The projection is divided as follows: the thickness of the triglyph two, band and listel one, quarter-round three and five-tenths, the fascia five-tenths, mutules twenty-four and five-tenths, corona two and

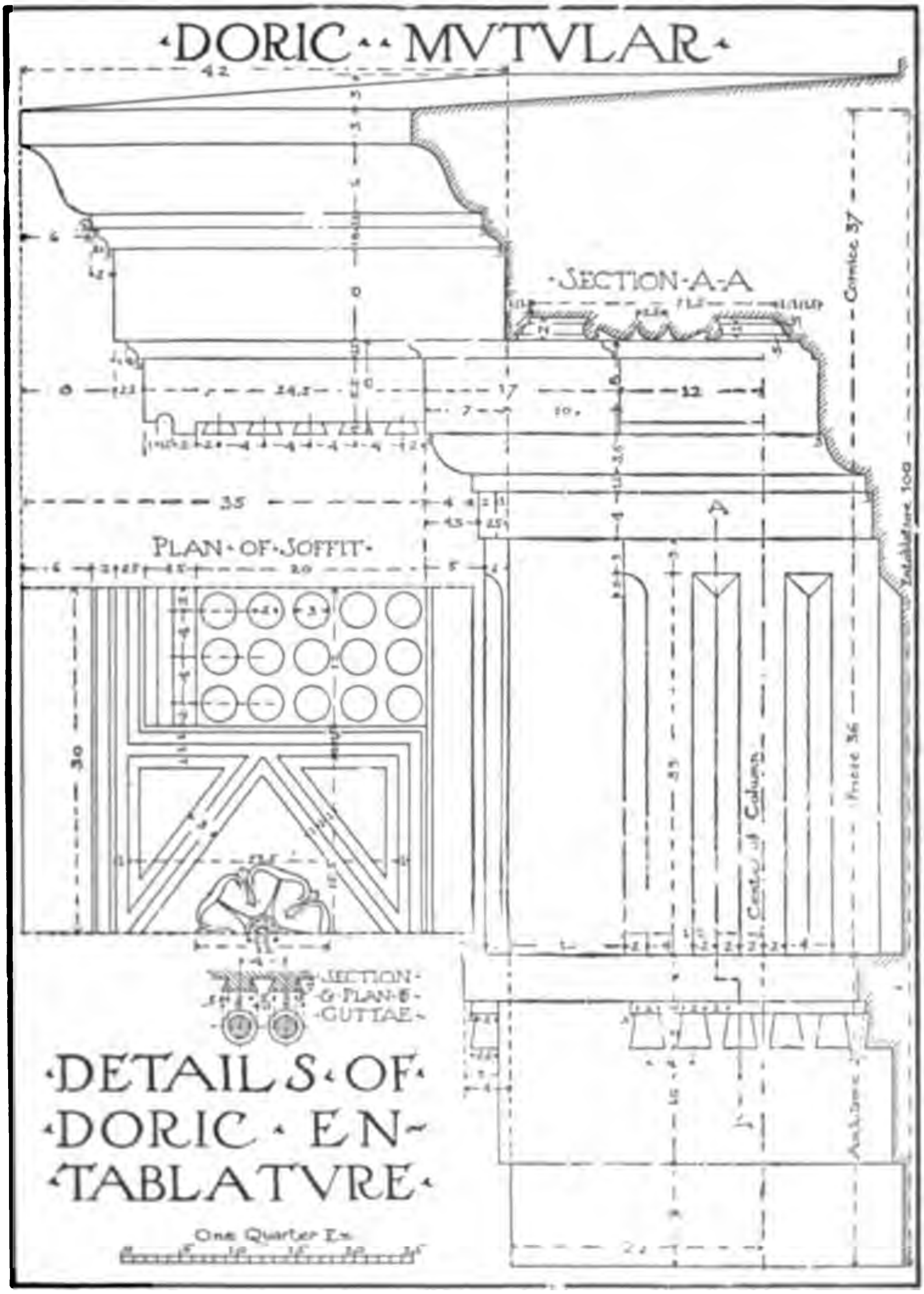


PLATE V.
(A reproduction at small size of Portfolio Plate V.)

five-tenths, fillet projection with cyma reversa two, and the cyma-recta six.

The mutules have a face five and five-tenths in height and form a profile composed of a square of one, a drip of one and five-tenths, and a reglet of two. The lower face of the mutules in Plate V is decorated with five rows of guttae, six in a row. As the mutules correspond in their position and in their width to the triglyphs, so the divisions of the guttae correspond with the edges of the channels of the triglyphs.

60. In the Doric Order the axes of columns and pilasters always correspond to the axes of the triglyphs above them. The upper semi-diameter of the column being twenty-two, the axis of the first triglyph is placed at twenty-two from the angle. The triglyphs are twenty-four in width, and the spaces which separate them are thirty-six. These spaces are exactly square, having a width equal to the height of the frieze, and are called "metopes." The mutules are of the same width as the triglyphs, twenty-four, and are placed on the same axes. Sometimes the metopes are decorated with objects of sculpture whose character is suggested by the character of the edifice. (Plates VIII and IX.)

61. The under part of the corona, or "soffit" of the Doric cornice is divided like the frieze, its divisions corresponding to the triglyphs and the metopes, as we have already seen. The arrangement of the soffit at the angle must be carefully observed:— in the denticular cornice, Fig. 9, there is included in the corner a division which corresponds to the width of the metope: first, a division of five; second, a division of 13; third, another division of five; and finally—at the angle—a square of twelve and a fillet of one. These parts are decorated with panels where sometimes are placed rosettes, winged thunder bolts, or other ornaments in accordance with the character of the edifice. In the soffit of the mutular cornice (Plate IX) there is at the angle a square of twenty-three and five-tenths, decorated with a panel which may be filled with sculpture, such as the winged thunder-bolt. The space between this panel and the mutule is ornamented with lozenge shaped panel, in which is a rosette.

62. The cymatium or cap of the pedestal (Plate VI) is fourteen parts high, of which the divisions are: a fillet of one, quarter-round of three, corona of seven, and listel of three. Its projection is nine, of which four is the projection of the congé and quarter-round, three and five-tenths of the corona, and one and five-tenths of the listel.

The base of the pedestal is forty-five in height, divided among a first plinth twenty-five, second plinth ten, listel three, cyma-reversa five, and fillet two. The projection of the base is eight, of which one is for the first plinth, one for the second plinth, four for the cyma-reversa, and two for the congé. The die of the pedestal is eighty-one parts high and its sides are in plane with the faces of the plinth of the column base.

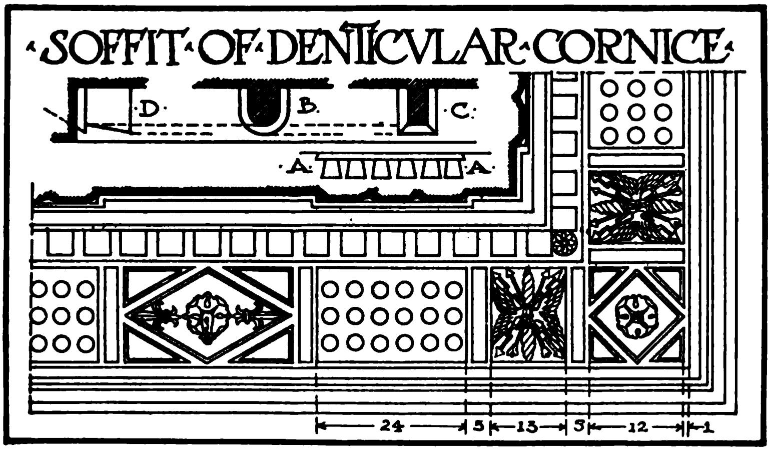


Fig. 9.

63. The impost is twenty-five in height; it is composed of an astragal of three, a necking of seven, a fillet of one, a quarter-round of three, a corona of eight, and a listel of three.

The projection of the impost is eight; for the quarter-round and fillet four, for the corona two and five-tenths, and for the listel one and five-tenths. The astragal projects two. The archivolt is thirty in height; it is composed of a first band nine, second band

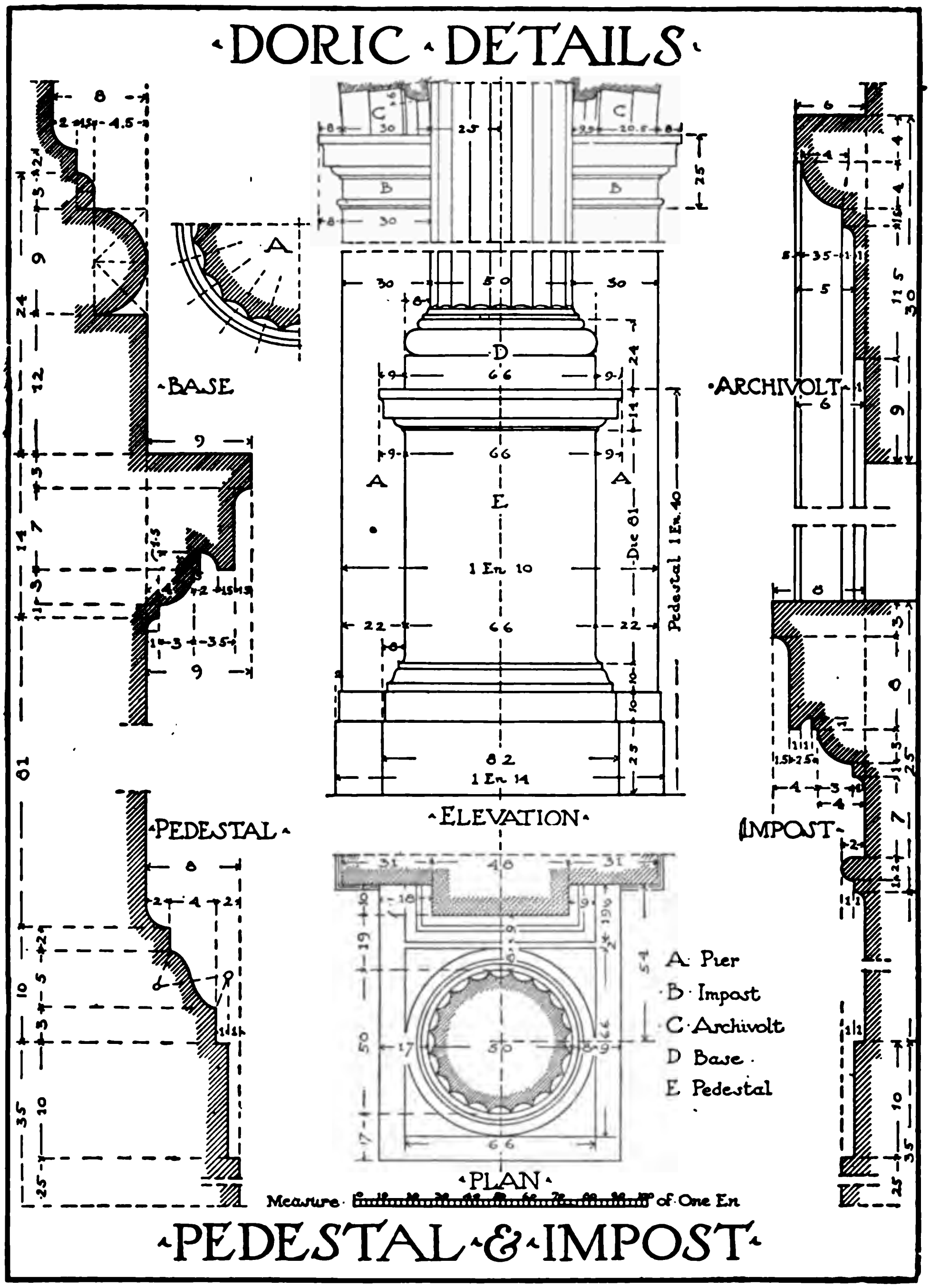


PLATE VI.

(A reproduction at small size of Portfolio Plate VI.)

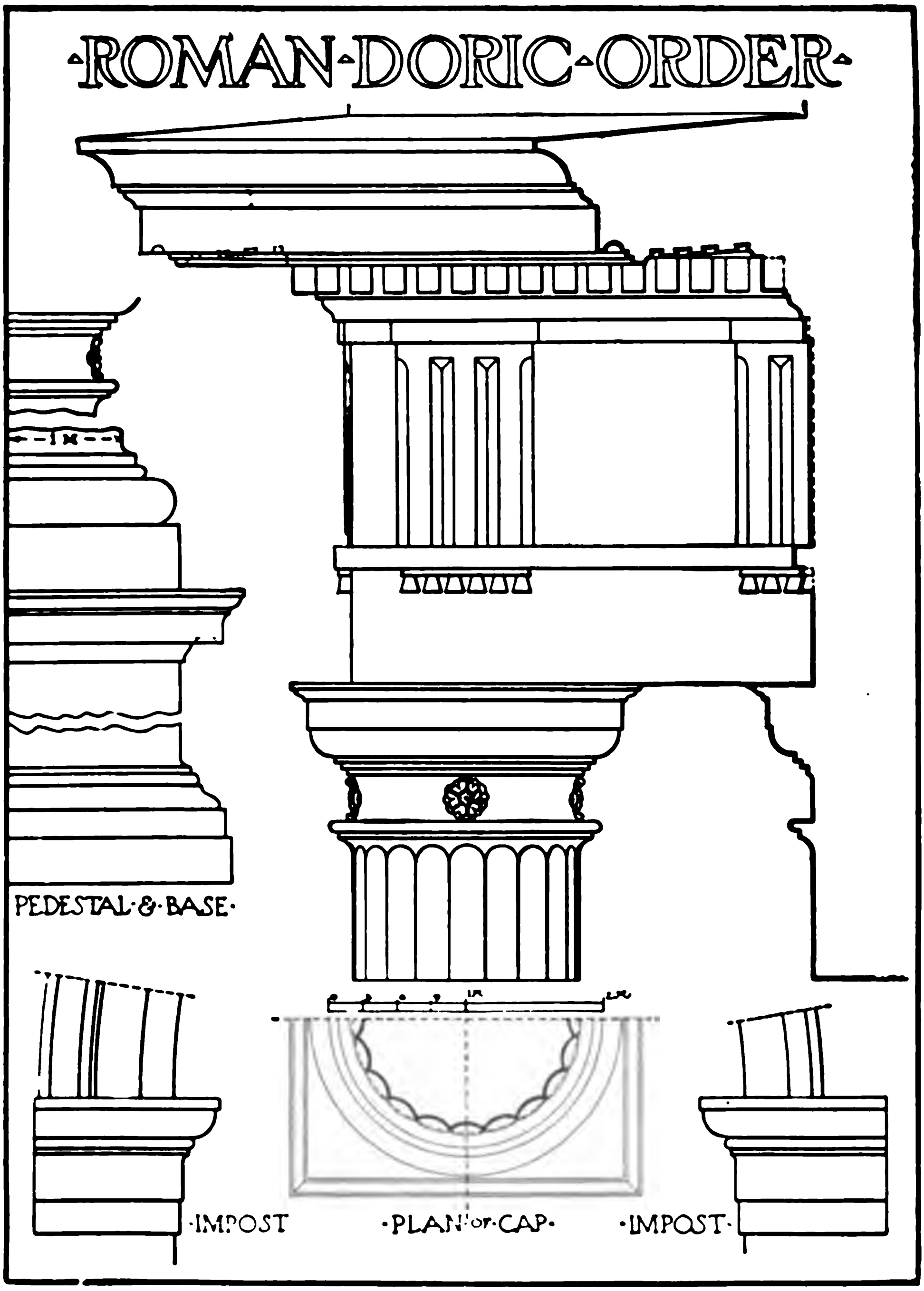


PLATE VII
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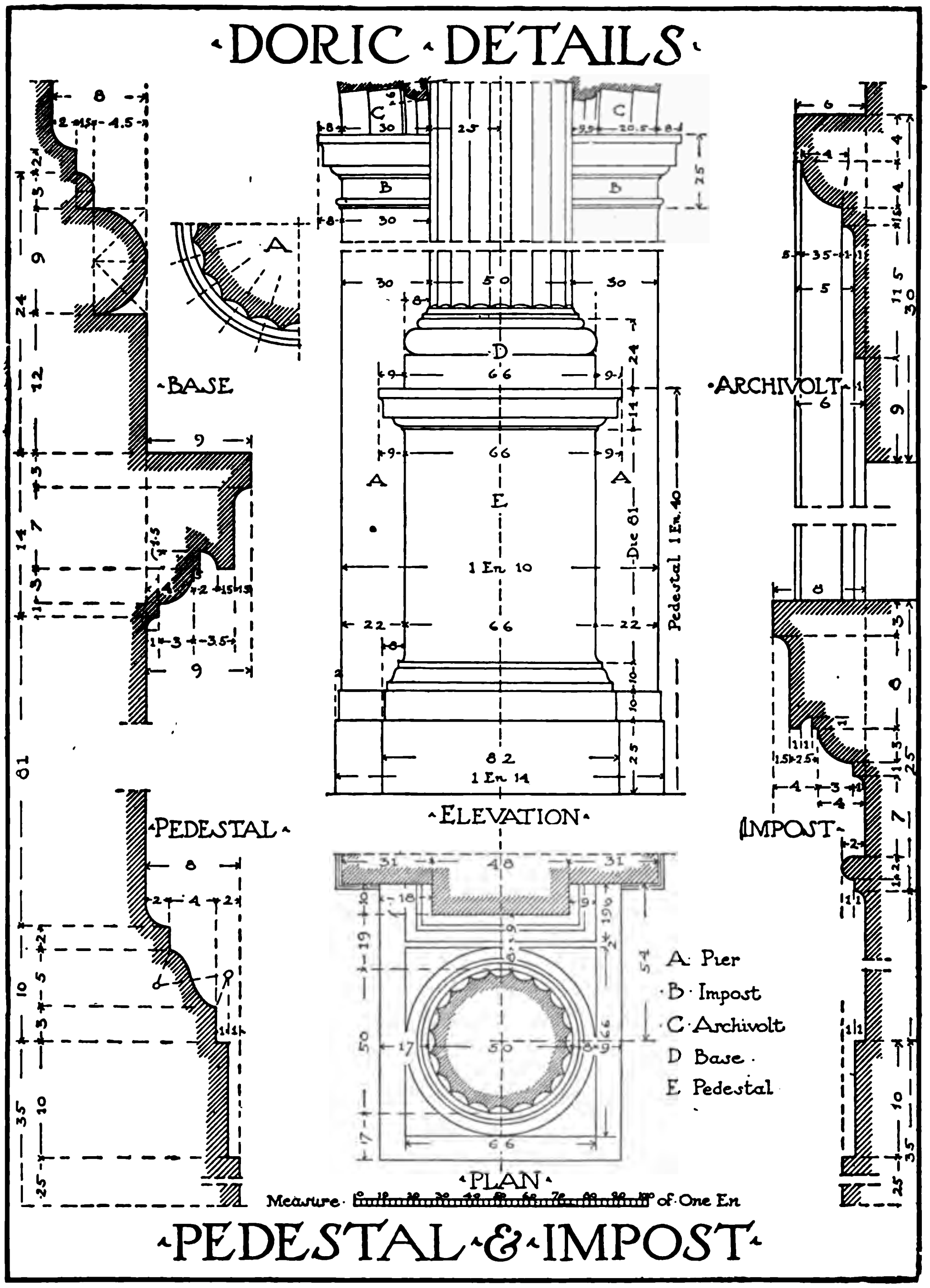


PLATE VI.

(A reproduction at small size of Portfolio Plate VI.)

THE IONIC ORDER.

65. The Ionic Order is distinguished principally by the form of its capital, of which the spiral scrolls, called volutes (Plate X) are the most important and determining characteristic.

66. The abacus of the Ionic capital is square; it projects six parts from the lower face of the architrave or from the upper diameter of the shaft of the column, is four parts in height and is composed of a fillet of two parts and a cyma-reversa of two. The fillet also has a projection of two. The upper face of the abacus forms a square of fifty-one on each side, and the lower face a square of forty-seven; the volutes grow from beneath the abacus on opposite sides; the catheti, which are the vertical axes or center lines of the volutes, are placed a distance of twenty-one from the axis of the column, or project one and five-tenths beyond its upper diameter. The height of the volute being twenty, the three following dimensions may be laid out on the catheti below the abacus; ten for the volute above the eye, two and five-tenths for the diameter of the eye, and seven and five-tenths for the lower part of the volute. The volute may then be drawn.

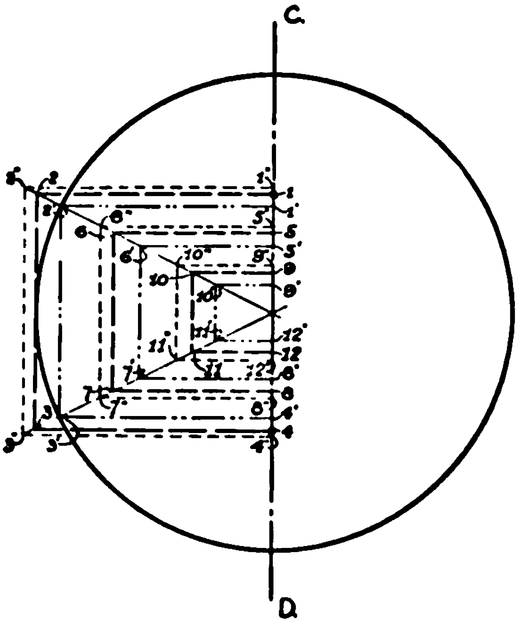


Fig. 11.

67. The spiral or volute is composed of twelve quarter circles drawn from twelve different centres, which may be located in the following manner. Having established, on a vertical line called the "cathetus," the height of the volute, twenty parts, it is divided into eight equal portions. The divisions are marked 1, 2, 3, 4, 5, 6, 7 and 8, commencing at the lower edge. Mark the middle eleven and five-tenths, fillet one and five-tenths, quarter-round four, and listel four.

The projection of the archivolt is six; second band one, fillet one, quarter round three and five-tenths, and listel five-tenths.

64. The width of the Doric pilaster in proportion to the column is shown in Fig. 10. The lower diameter of the Doric column being fifty and its upper diameter forty-four, the difference is six, which is divided into three equal parts, of which one is taken for the difference in width between the neck and base of the pilaster, forty-eight being the width at the base and forty-six at the bottom of the cap.

The difference of projection of the bases is made up in the congé which projects two for the column and three for the pilaster.

The difference in the projection of the caps is made up in the three annulets and the quarter-round of the denticular capital and in the astragal and quarter round of the mutular capital.

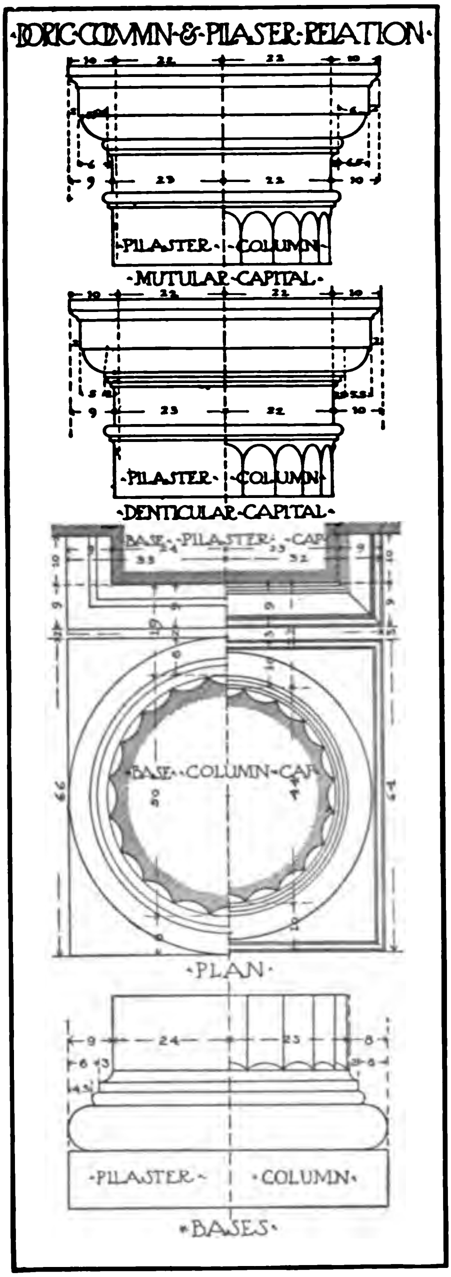


Fig. 10.

THE IONIC ORDER.

65. The Ionic Order is distinguished principally by the form of its capital, of which the spiral scrolls, called volutes (Plate X) are the most important and determining characteristic.

66. The abacus of the Ionic capital is square; it projects six parts from the lower face of the architrave or from the upper diameter of the shaft of the column, is four parts in height and is composed of a fillet of two parts and a cyma-reversa of two. The fillet also has a projection of two. The upper face of the abacus forms a square of fifty-one on each side, and the lower face a square of forty-seven; the volutes grow from beneath the abacus on opposite sides; the catheti, which are the vertical axes or center lines of the volutes, are placed a distance of twenty-one from the axis of the column, or project one and five-tenths beyond its upper diameter. The height of the volute being twenty, the three following dimensions may be laid out on the catheti below the abacus; ten for the volute above the eye, two and five-tenths for the diameter of the eye, and seven and five-tenths for the lower part of the volute. The volute may then be drawn.

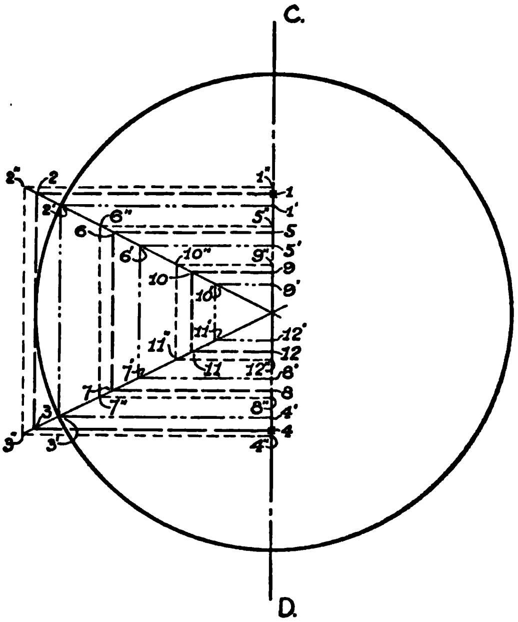


Fig. 11.

67. The spiral or volute is composed of twelve quarter circles drawn from twelve different centres, which may be located in the following manner. Having established, on a vertical line called the "cathetus," the height of the volute, twenty parts, it is divided into eight equal portions. The divisions are marked 1, 2, 3, 4, 5, 6, 7 and 8, commencing at the lower edge. Mark the middle

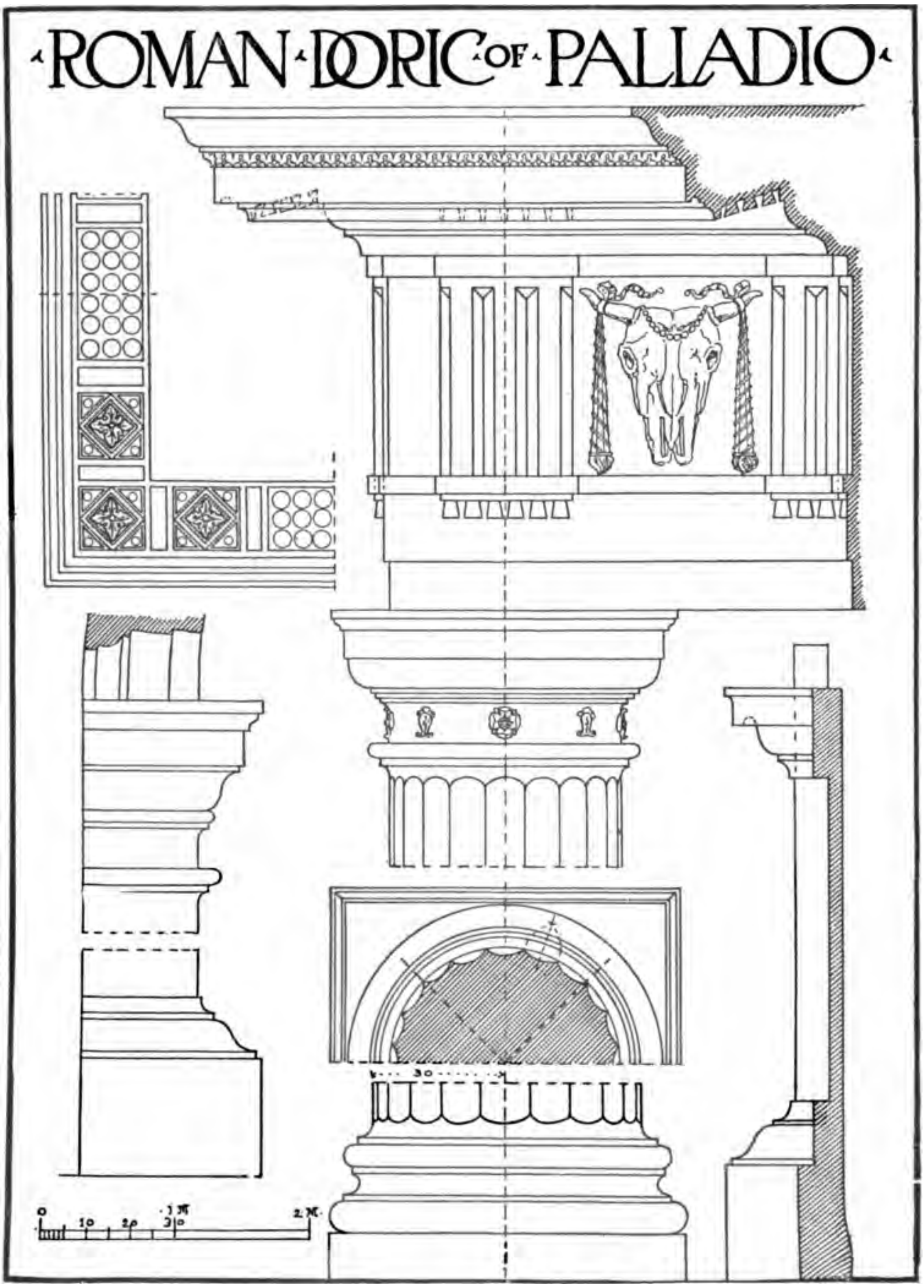


PLATE VIII.

(A reproduction at small size of Portfolio Plate VIII.)

of the space included between the points 3 and 4, and draw through this central point a horizontal line. Taking this same point for the center, draw with a radius of one-half part, a circle which will be the eye of the volute. This eye is shown enlarged in Fig. 11. Divide into two equal parts the two radii of the eye which coincide with the cathetus, C–D giving the points 1 and 4, and here construct a square of 1, 2, 3, and 4, in the direction in which the mass of the volute is to be drawn, in this case on the left of the cathetus. The side of this square which coincides with the cathetus being divided into six equal parts, the other two squares —five, six, seven, eight, and nine, ten, eleven, twelve—may be drawn. In this manner are obtained twelve center points at the corners of the squares, numbered from 1 to 12 from which are drawn the twelve quarter circles that constitute the exterior spiral. Horizontal and vertical lines from these twelve centres determine the limits of the twelve quarter circles.

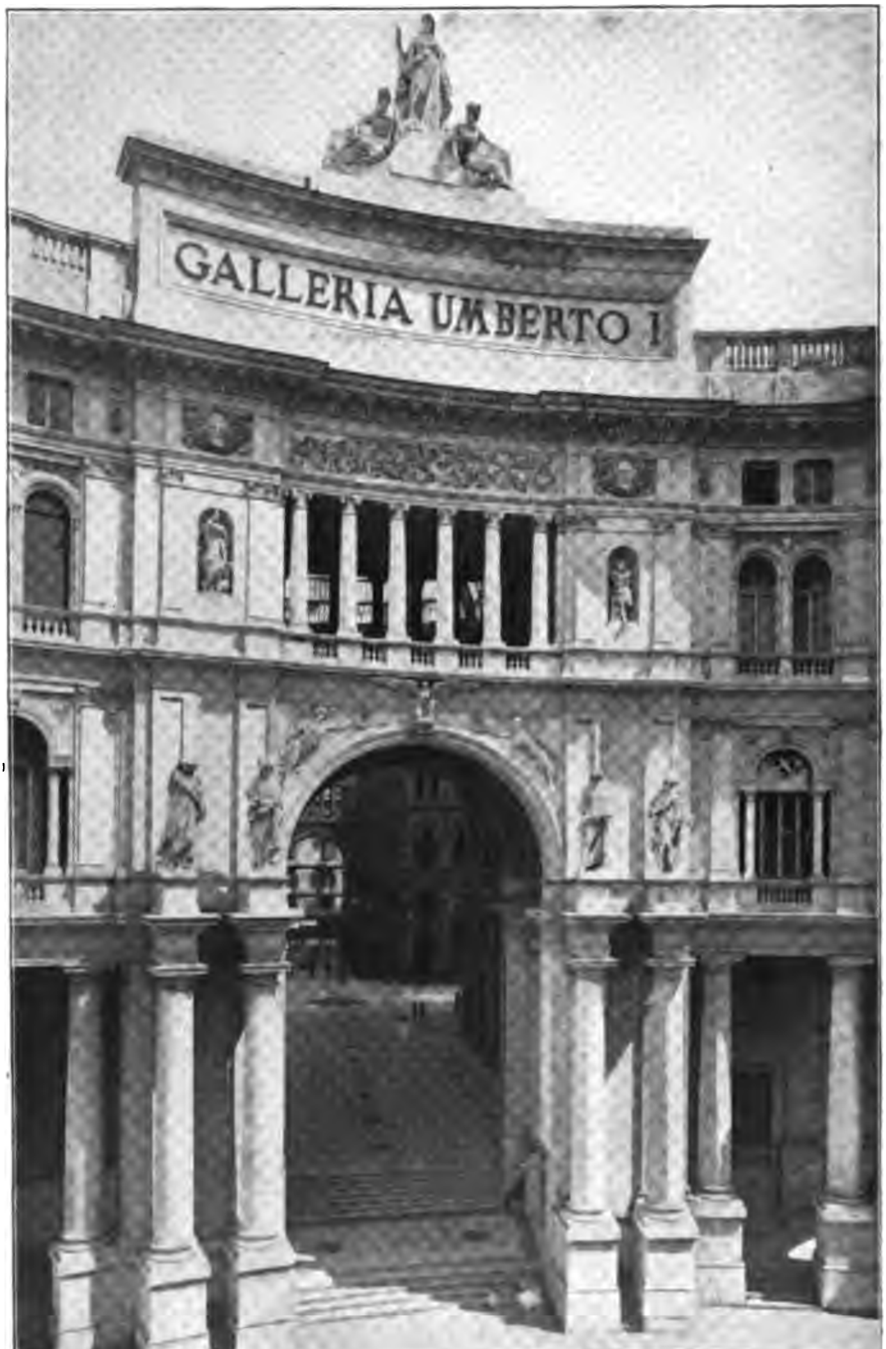
68. In order to trace the second spiral which forms the inner edge of the fillet of the volute, divide into three parts on the cathetus (Plate X) the space included between the first and the second revolution, that is to say, the distance between the points six and eight. One-third of this distance 6-8 will be the width of the fillet. To find the twelve centers for the second spiral, draw three new squares of which the height and position are determined by dividing into thirds the space between the squares of the first spiral so that the new square 1′, 2′, 3′, 4′, (Fig. 11) shall be within the square 1, 2, 3, 4, by just ⅓ the distance from 1 to 5 and from 4 to 8. The new squares 5′, 6′, 7′, 8′, and 9′, 10′, 11′, 12′, will have corresponding relations to squares 5, 6, 7, 8, and 9, 10, 11, 12, respectively. From the points 1′ to 12′ inclusive, the second spiral may be drawn in the same manner as the first.

69. For the outer fillet, which appears below the abacus and beyond the cathetus, (Plate X) find four center points by constructing a new square larger than the square 1, 2, 3, 4, (Fig. 11). This is determined by taking on the cathetus C–D, half of the distance from the point 1 to the point 1′, and measuring this distance outside of the point 1 to the point 1″, from which 2″, 3″, 4″, etc., can be readily drawn.

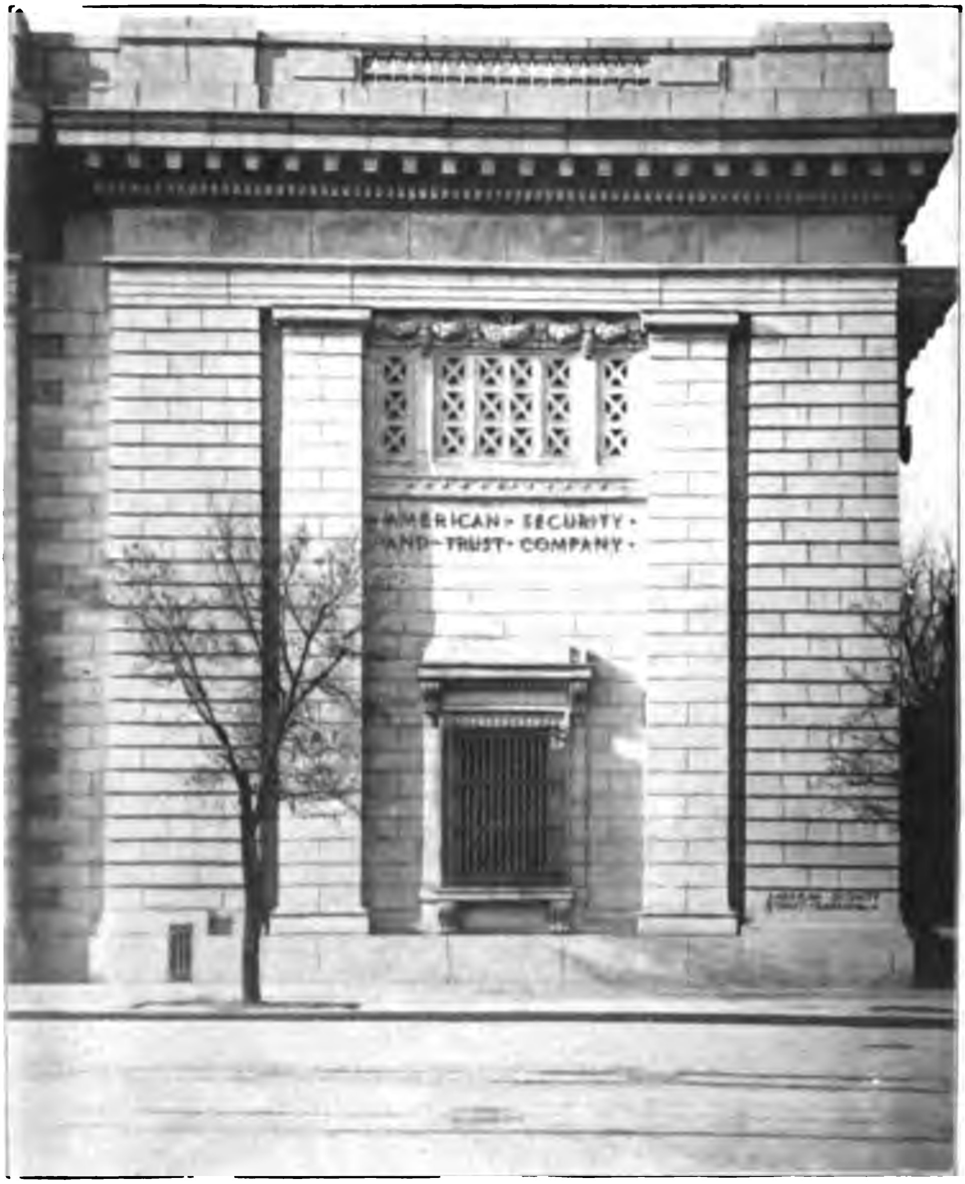
70. The space included between the lower part of the abacus and the first complete revolution of the volute forms a flat band which ties together the two volute faces of the capital, and this band is set back two and five-tenths from the projection of the abacus. (See section through side of capital.) The fillet disappears in this face by a quarter of a circle drawn from the point six on the cathetus. The space between the lower line of this face and the horizontal line passing through the center of the volute eye is taken up by a quarter-round drawn with a radius of six and projecting four and five-tenths from the face of the volutes or eight from the outside of the shaft, as may be seen at B in the section on the right of the drawing of the "Side of the Capital." This moulding follows the circular plan of the shaft and is ordinarily decorated with eggs and darts. Below this quarter-round is found an astragal which unites the capital with the shaft; this astragal is three and five-tenths parts in height, of which two and five-tenths are for the bead and one for the fillet, the projection is two and five-tenths of which one and five-tenths is for the bead, and one for the congé.

71. The side face of the capital, called the "roll," unites the volutes of the two faces. It is forty-six parts in width and is divided in the center by a sunken band of six (or seven) parts in width which is ornamented with two bead mouldings of two parts each spaced one part apart. The height of this band below the abacus is fourteen, as shown in the section; the space included between it and the return or inner edge of the face of the volute is sixteen or sixteen and five-tenths. This part is bell-shaped, and its outline is obtained on the side of the capital as follows: Having prolonged the horizontal line marking the lowest point of the volutes, find on it two points, the one, two and five-tenths from the band at the center, the other five and five-tenths from the inner edge of the volute, and here erect two perpendiculars; on the first of which mark heights of four and five-tenths, and of eight and five-tenths, and on the second three and five-tenths, and nine and five-tenths. Four points *a*, *b*, *c* and *d* will be obtained by this means through which the curves may be readily drawn.

The section of the roll may be drawn thus: Draw the profile of the abacus and of the astragal. Then draw the exterior contour



ENTRANCE TO THE "GALLERIA UMBERTO I." IN NAPLES, ITALY
Ernesto de Mauro, Architect.
Built in 1887-90.



SIDE VIEW OF THE MODERN BANK BUILDING OF THE AMERICAN SECURITY AND TRUST COMPANY, WASHINGTON, D. C.

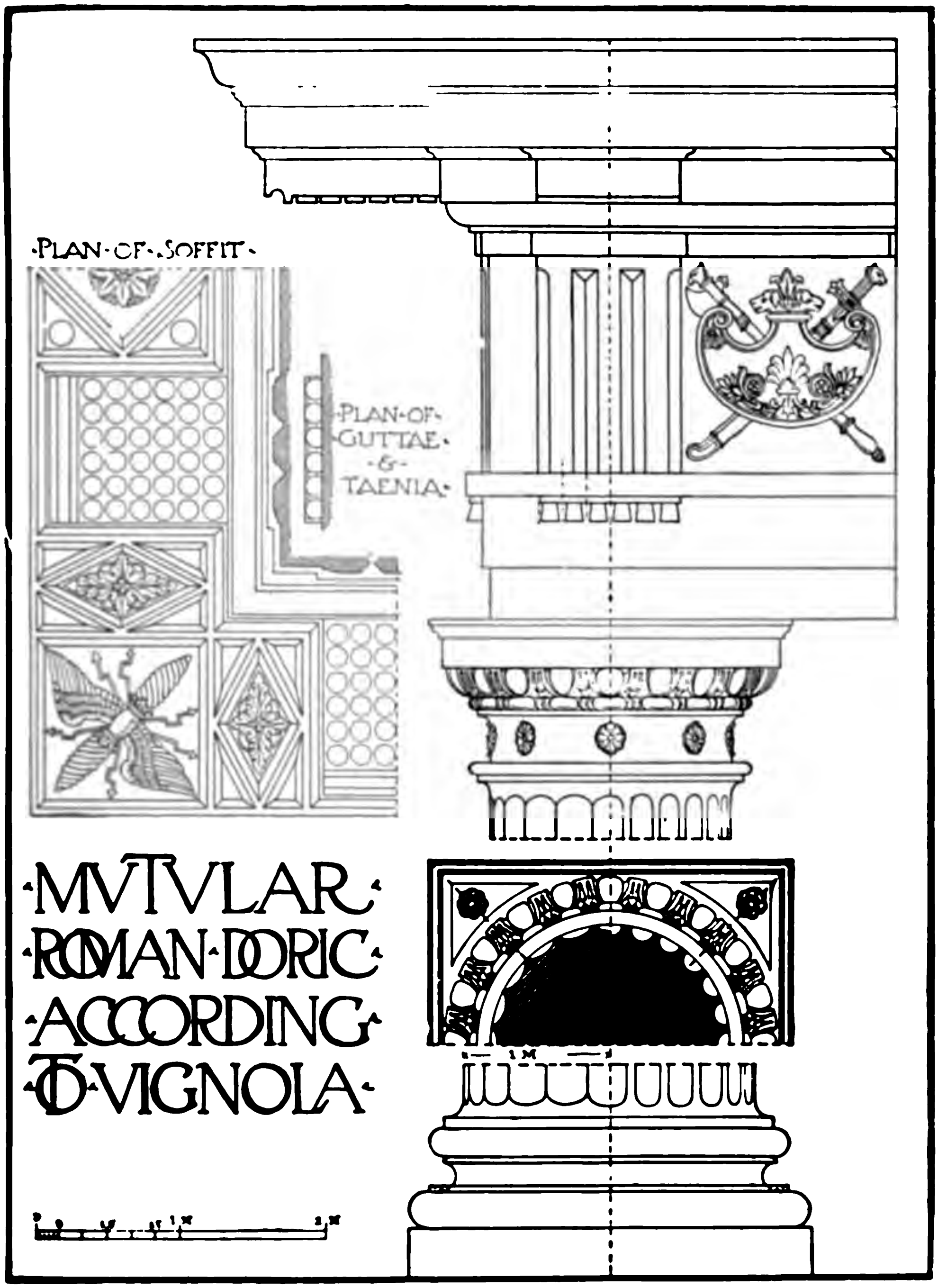


PLATE IX.
(A reproduction at small size of Portfolio Plate IX.)

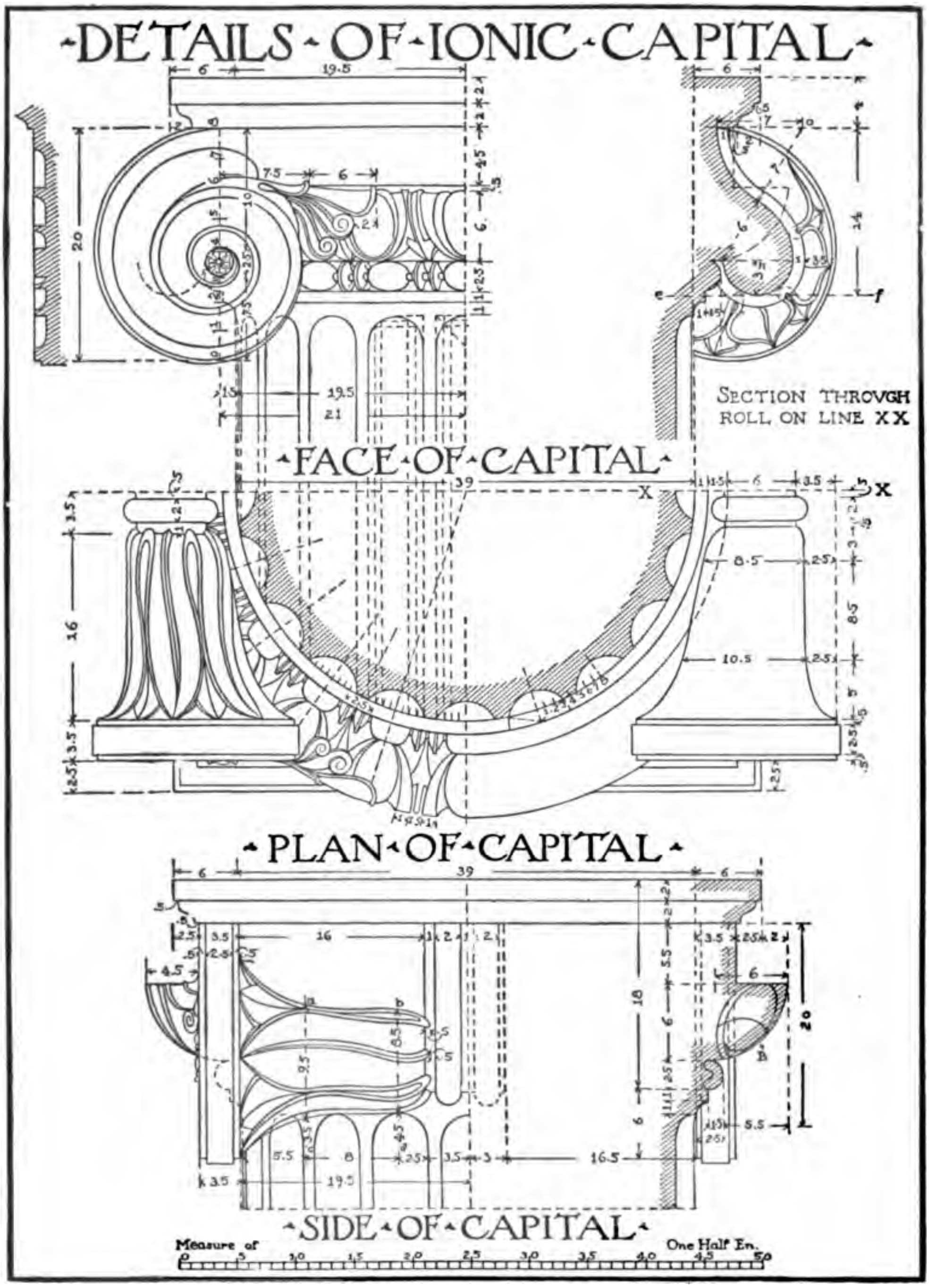


PLATE X.

(A reproduction at small size of Portfolio Plate X.)

of the volute as far as its intersection with the line of the shaft, by establishing the cathetus and the first three points of the squares 1, 2, 3, and 1′, 2′, 3′ in the eye. Draw a horizontal line *e f* marking the height of the center of the roll, fourteen parts below the abacus, and another horizontal three parts higher up. On the latter horizontal fix a point *h* six and five-tenths from the edge of the volute; from this point, with a radius of three, a semi-circumference may be drawn whose intersection with the horizontal *k* gives the center of the second arc of the section, which may be drawn with a radius of six. Then continue the lower line of the abacus and mark a point *o* three and five-tenths beyond its projection; this is the center of a third arc of the circle which may be drawn with a radius of seven.

72. The principal figure of this plate (X) is the plan of the capital, which shows the horizontal form and the disposition of the rolls, as well as the combination of the circular mouldings with the square mass of the capital.

73. The Ionic capital is generally enriched with carved ornaments, the quarter-round is carved with eggs and darts, the bead of the astragal is carved with bead and reel ornaments and the roll is carved with leaves, more or less detailed, while a rosette is frequently carved in the circle forming the eye of the volute.

74. The channels of the Ionic column differ from those of the Doric in the fillets which separate them; they are shown in this plate to be twenty in number, and the width of the fillet is equal to one-third of the width of the channel, so that, after having divided the circumference of the shaft into twenty equal parts, each of these is divided into eight, two of these eight parts being given to the fillet and six to the channel.

The plan of each channel is drawn from a center placed at a distance of one part outside of the circumference of the shaft, as is shown in the plate. (Plate X.)

75. The number of flutings of the Ionic shaft is frequently twenty-four instead of twenty, as here shown. In the attempt to differentiate between the Ionic and Corinthian capitals it is often desirable to allot a smaller number of flutings to the Ionic shaft. When this order is used at a small scale, it is very proper that the channels should be few in number, so as not to complicate the carving. For use in wood, however, twenty-four channels, with their centers placed on the line of the column circumference, are preferable, as they are sharper, more effective and better accord with the accepted number of seven flutings for the pilaster shaft.

The flutings as shown in plan on Plate X are very shallow and do not "tell" as much as should be expected of this method of ornamenting the column. It is therefore suggested that in actual practice the method and number of flutings shown on the plan of the Corinthian shaft, Plate XIX, be also employed on the Ionic.

76. The cornice of the Ionic order (Plate XI) is less complicated than that of the Doric, having, with the exception of the dentils, none but horizontal divisions. The cornice is forty parts in height and its projection is equal to its height.

Certain of the mouldings are carved with the leaf and tongue, the egg and dart, and the bead and reel, the perpendicular divisions of which correspond to the axes of the dentils, which in turn correspond to the axes of the columns. The frieze is thirty parts in height and undecorated; the architrave is the same height as the frieze, and is composed of three bands or fascias and a crowning moulding. The band which rests on the capital is six in height and its face is plumb with the upper diameter of the column and with the frieze; the second band is seven parts in height and projects one part beyond the lower; between the second and third bands occurs a cyma-reversa two parts high; this third band has a projection of one and five-tenths beyond the second. The assemblage of mouldings crowning the architrave is composed of a bead moulding of one and five-tenths parts, and a cyma-reversa of three, crowned by a listel of two and five-tenths. The projection of these mouldings beyond the third band is three and five-tenths, so that the extreme projection of the architrave is six.

77. The base of the Ionic order (Plate XII) is twenty-three and five-tenths parts in height; it is composed of a plinth of eight, a first torus of six, a fillet of one and five-tenths, a scotia of three, a second fillet of one, and a second torus of four. The projection of the base, including the congé of the shaft, is eight, of which two is the projection of the congé. This is shown on the enlarged section of the pedestal and column base at the left.

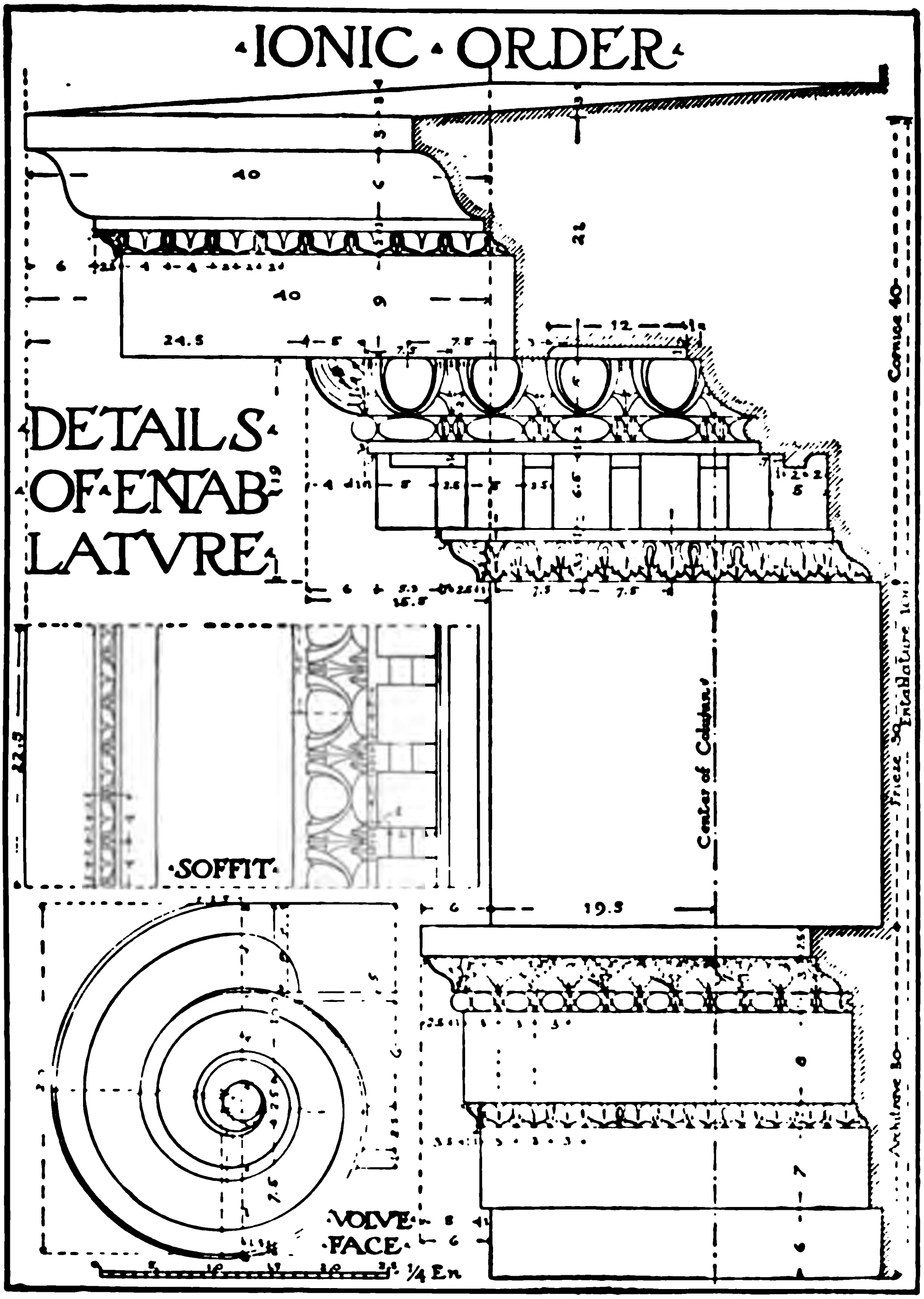


PLATE XI.
(A reproduction at small size of Portfolio Plate XI.)

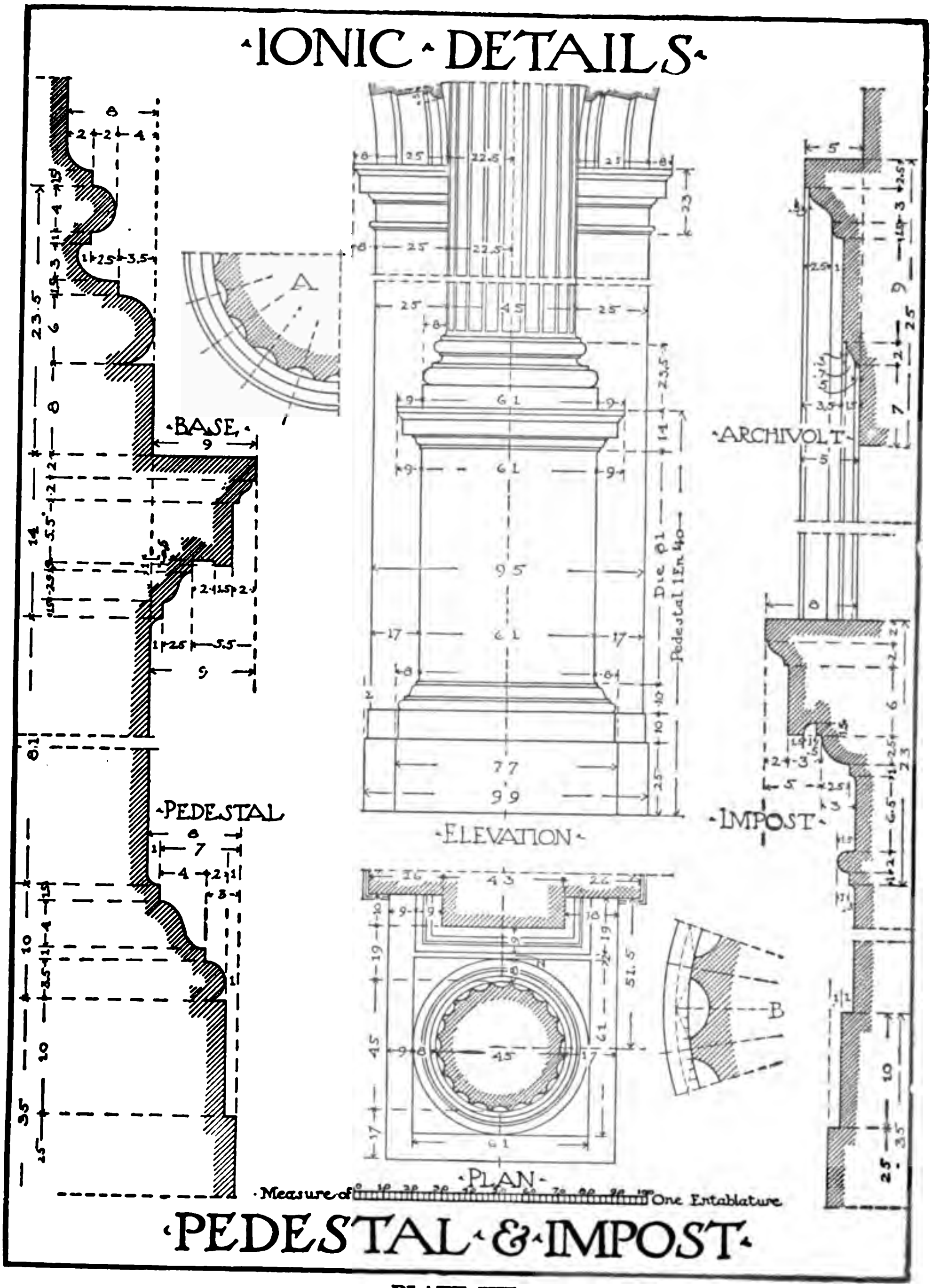


PLATE XII.

(A reproduction at small size of Portfolio Plate XII.)

78. The cymatium or cap of the pedestal is fourteen in height, divided as follows: a fillet, one and five-tenths, cyma-recta, two and five-tenths, surmounted by a small fillet of five-tenths, a corona of five and five-tenths, a cyma-reversa of two, and a listel of two. The projection of the cap from the plinth of the column base and the die of the pedestal is nine, of which two parts are for the cyma-reversa and listel, and three and five-tenths for the corona in which is cut a small drip. The base of the pedestal is forty-five in height divided thus: first plinth, twenty-five; second plinth, ten; torus, three and five-tenths; fillet, one; cyma-reversa, four; upper fillet, one and five-tenths. The projection of the base is eight, of which one is for the congé, four for the cyma-reversa, two for the torus, and one for the first plinth.

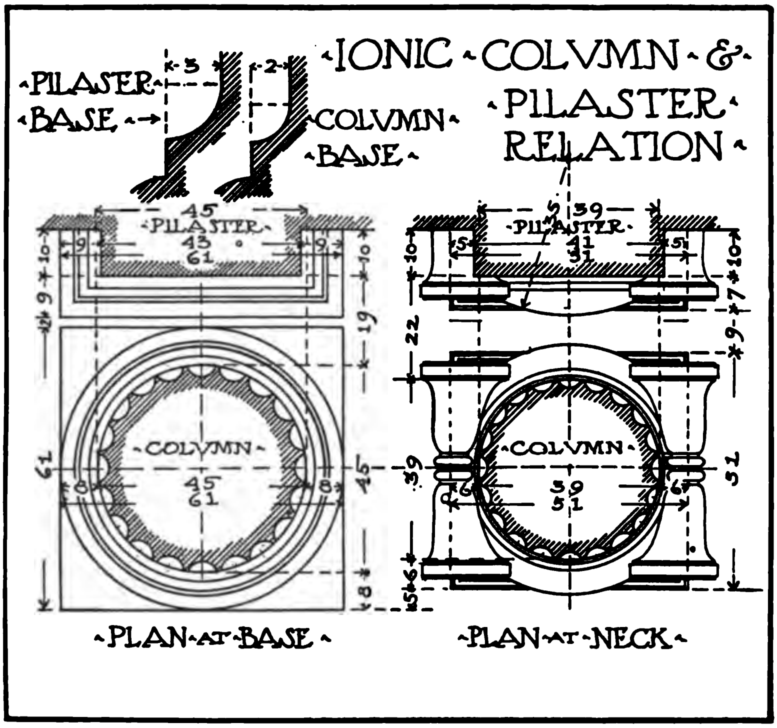


Fig. 12.

79. The impost is twenty-three parts high and is sub-divided as follows: astragal three; frieze six and five-tenths; fillet one;

quarter round, two and five-tenths; corona, six; cyma-reversa, two; listel, two. The projection of the impost is eight; two for the cyma and listel, three for the corona, and three for the quarter-round and fillet. The archivolt is twenty-five in width composed of a first band of seven, a cyma of two, a second band of nine, a bead of one and five-tenths, a cyma of three, and a listel of two and five-tenths. The projection of the archivolt is five, of which one and five-tenths is for the projection of the second band beyond the first, one for the bead, and two and five-tenths for the cyma and its fillet.

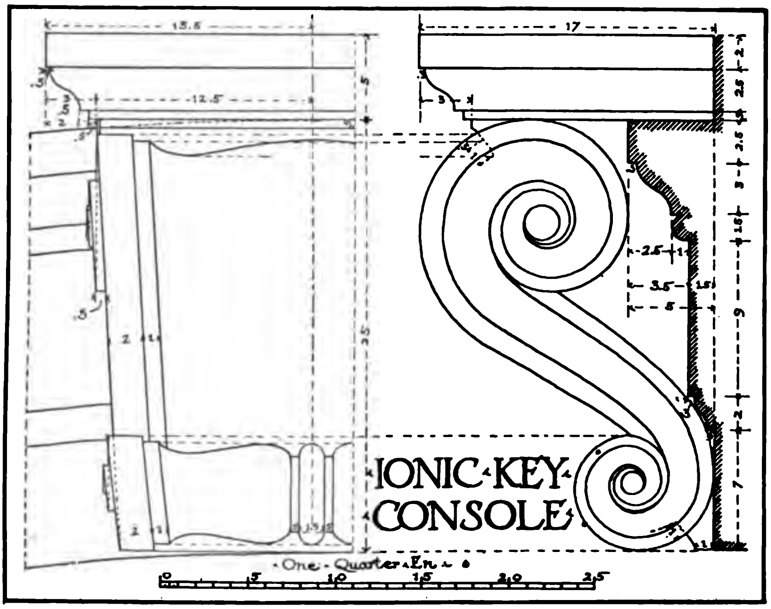


Fig. 13.

80. The relation of Ionic column taper to pilaster taper (Fig. 12) is as follows: The lower diameter of the Ionic column is forty-five, and its upper diameter thirty-nine, the difference is six, which, divided into three parts, as in the Doric order, gives for the lower width of the pilaster forty-three, and for the upper width forty-one. The projections of the bases differ only in the congé of the shaft which measures three for the pilaster and two for the column.

The disposition of the capital is the same for the pilaster as for the column so far as the volutes are concerned, the catheti being

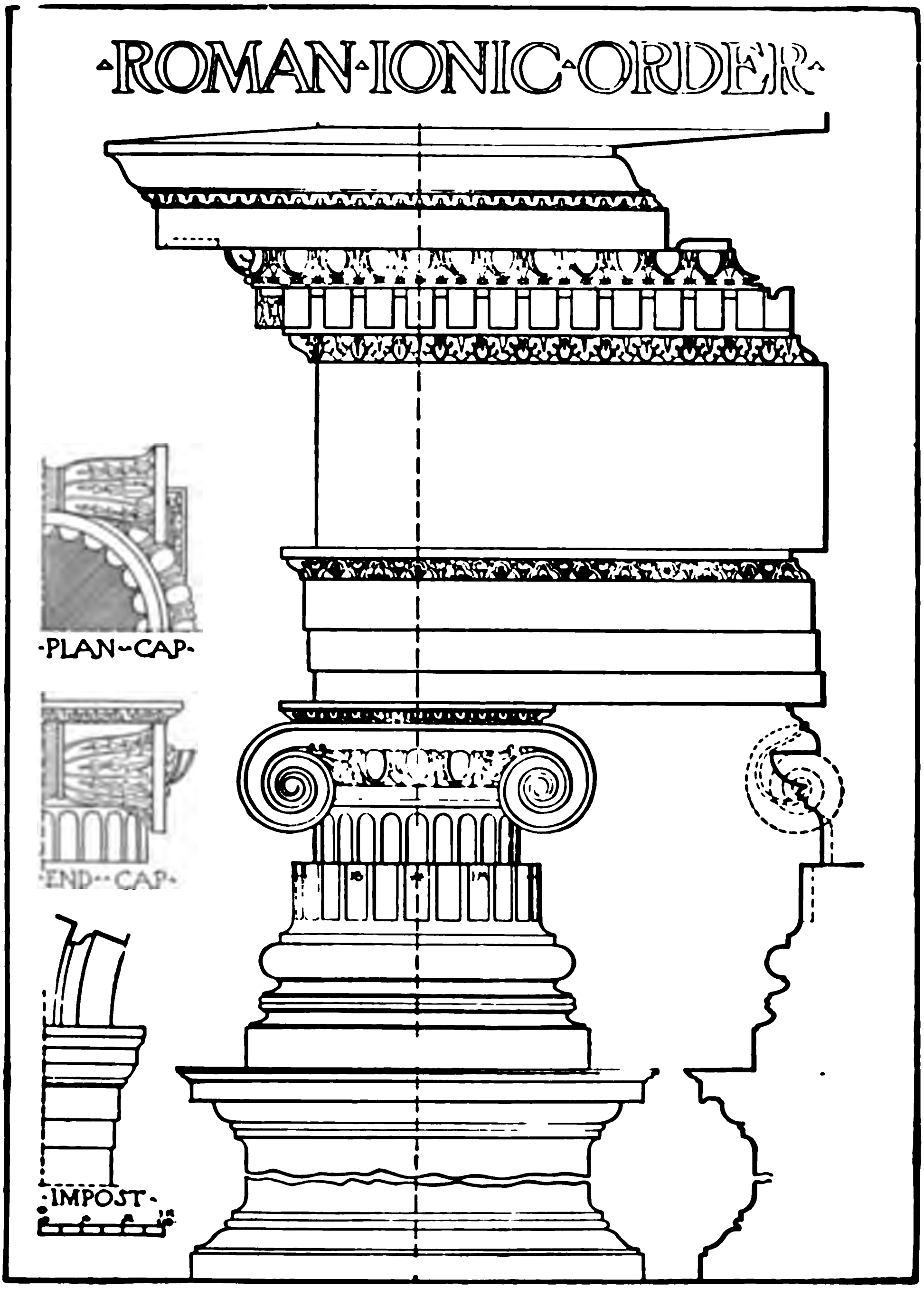


PLATE XIII.
(A reproduction at small size of Portfolio Plate XIII.)

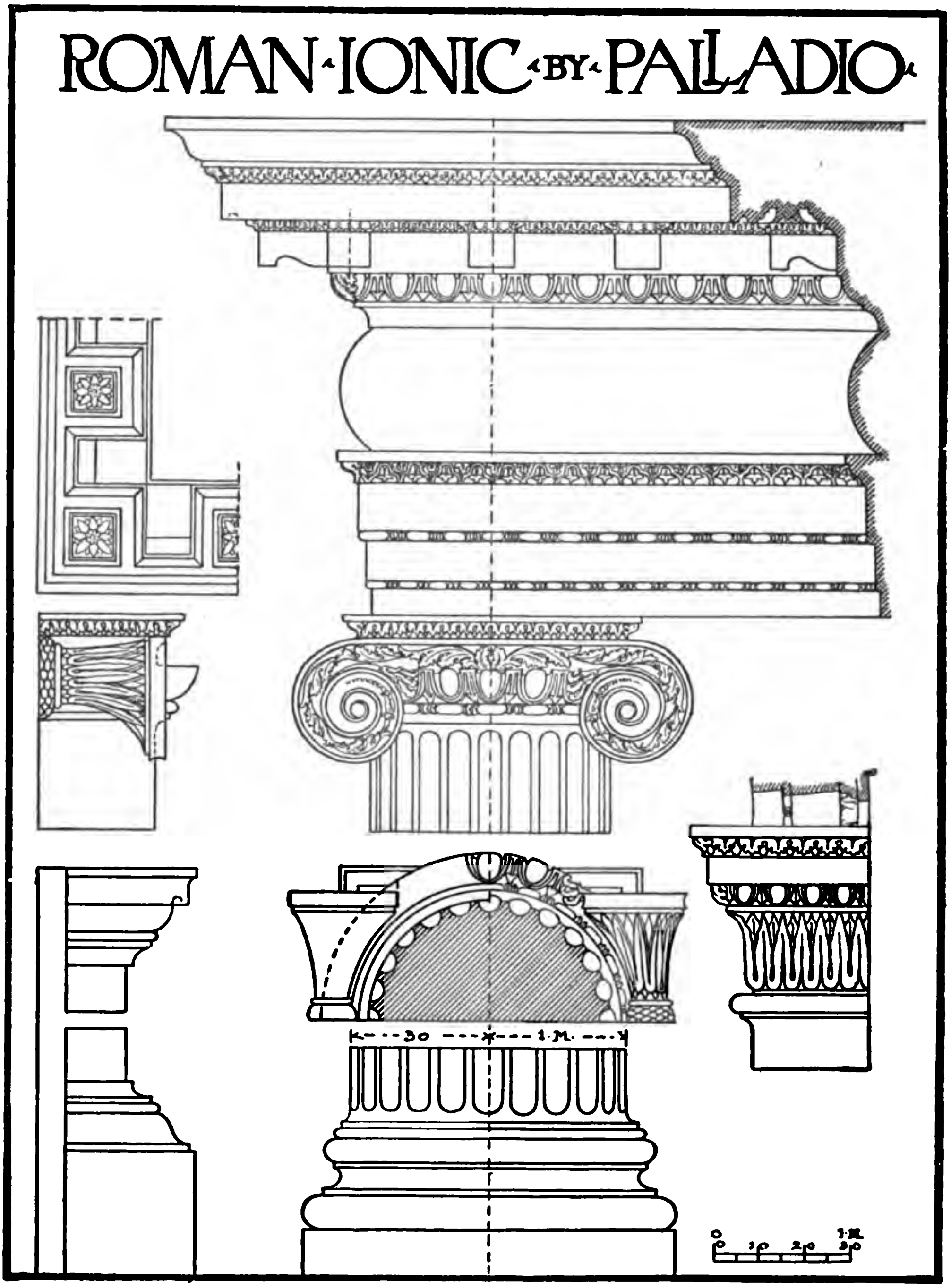


PLATE XIV.

(A reproduction at small size of Portfolio Plate XIV.)

the same distance (forty-two parts) from each other. It may be noticed only in the plan of the capital of the pilaster, that the outer edge of the quarter-round forms an arc of a circle drawn with a radius of thirty-five, while the astragal is rectangular in plan like the face of the pilaster, and, running between the volutes, connects them with one another.

81. In Fig. 13 will be found a drawing of the Ionic console. Sometimes one of these consoles is placed at the crown of an arch intersecting the archivolt. The sides of such a console radiate from the center of the arch; the stone on which the console is carved is called the "key" of the arch or the "keystone."

THE CORINTHIAN ORDER.

82 The Corinthian is an elaborately formal and dignified Order, and all the details which enter into its composition will bear analyzing with the greatest possible care.

83. The Corinthian capital (Plate XVII) is in form similar to a cylindrical vase covered by an abacus with hollowed sides and with corners cut at an angle of forty-five degrees, in plan with the sides of the square containing the abacus. Against this vase or "bell" are placed two rows of leaves whose heads are curved. The first row, which is applied directly above the astragal of the shaft, is composed of eight leaves; these are called the small leaves. From the intervals between these small leaves arise the stems of the second row of leaves which are larger. Between these large leaves and just over the centers of the small ones, eight stems arise, from which develop eight other leaves which, divided into two parts, recurve above the large leaves at the corners of the abacus and at the center of each of its faces. These leaves, which are very much distorted, are called caulicoli. From these caulicoli arise sixteen volutes of which eight large ones unroll in pairs, back to back, under the corners of the abacus, and eight small ones, also in pairs, extend towards the centers of the four sides of the abacus. Among the small volutes next to the bell is placed an ornament which is called the floweret, and above this, against the mouldings of the abacus, is a rosette.

84. The small leaf, Plate XVI, is placed on a vertical axis against the vase in such a manner that the base rests on the astragal and its face corresponds to the face of the shaft, so that, the leaves being one part thick at the bottom, the vase of the capital must be two parts smaller than the column at the neck.

The sweep of the leaf has a projection of six from the base and forms a delicately curved profile the shape of which may easily be determined from the plate. The squares represent a unit of two parts in all cases.

The developed width of the leaf is equal to its height, thirteen parts. It is represented in front elevation, half developed to its full height, and half in its recurved position as it is placed on the capital. The developed half shows the under part of the curved top; it may be seen that a perpendicular axis divides the leaf into two perfectly symmetrical halves, each halt being divided into four divisions which themselves are sub-divided—the topmost and lowest ones into four pointed lobes, the two others into five.

Notice that in order to present the ordinary profile above the astragal, the leaf preserves its entire mass in the lower part for a small distance above the base.

85. The large leaf, (Plate XV) which grows from above the astragal, in the small space between two of the smaller leaves, (see Plate XVII) projects nine parts beyond the upper diameter of the shaft. Its details are in almost every particular similar to those of the small leaf.

86. The stems of the caulicoli (Plate XVI) are channeled batons or staves each crowned by a calix from which the distorted leaf or caulicolus springs (Plates XV and XVI.)

87. It may be noticed that in the direct elevation (Plate XVI) the enrollments of the volute are arranged in the form of a corkscrew, and the section shows the manner in which their faces are hollowed out. The floweret (Plate XV) is seen only in direct elevation in the general plate, being attached to the vase on the axis of each space between the smaller volutes. It is shown separately on this plate, with a horizontal section.

88. This same plate shows the detail of a rosette having six divisions, in the center of which is found a slug whose tail is turned upward.

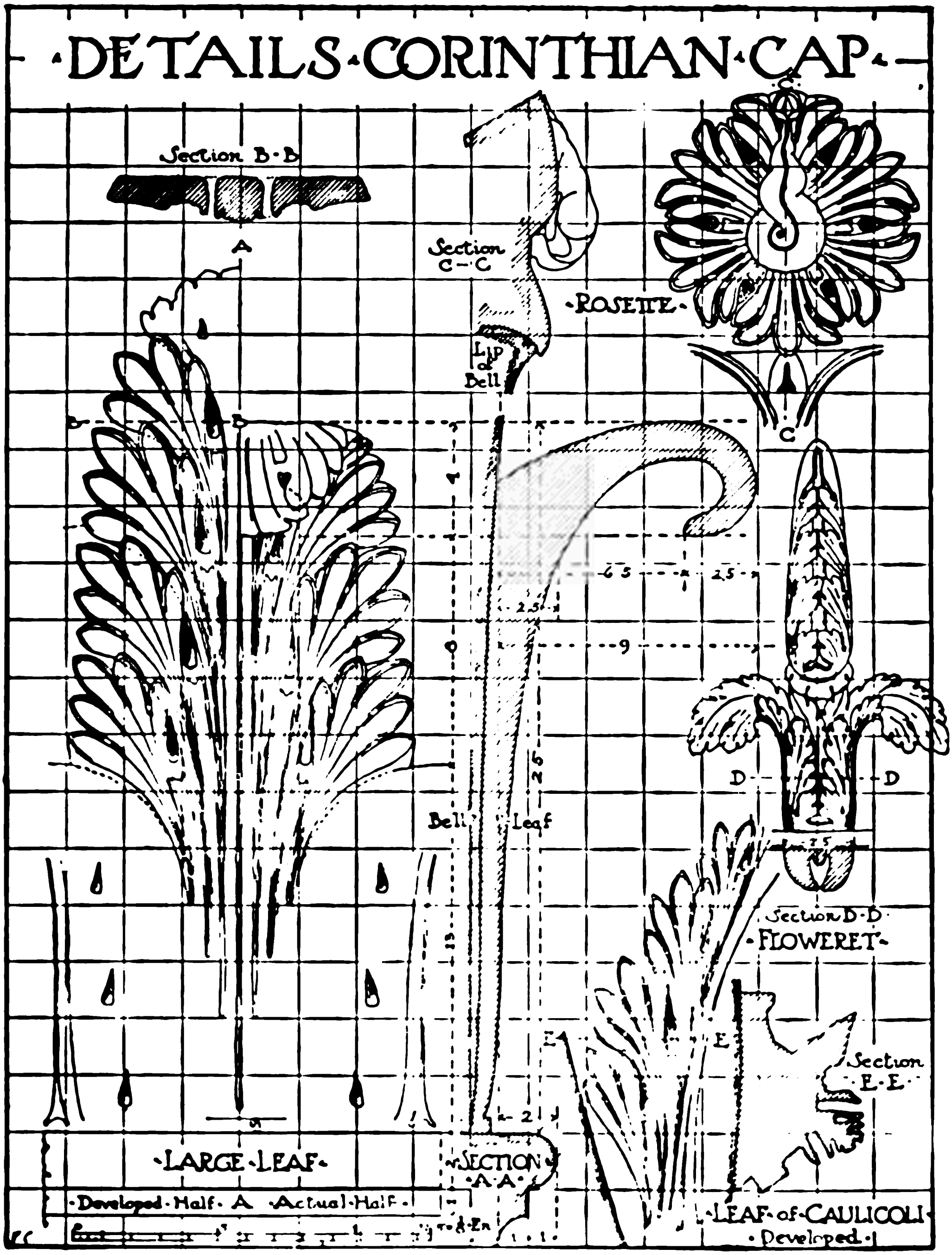


PLATE XV.

(A reproduction at small size of Portfolio Plate XV.)

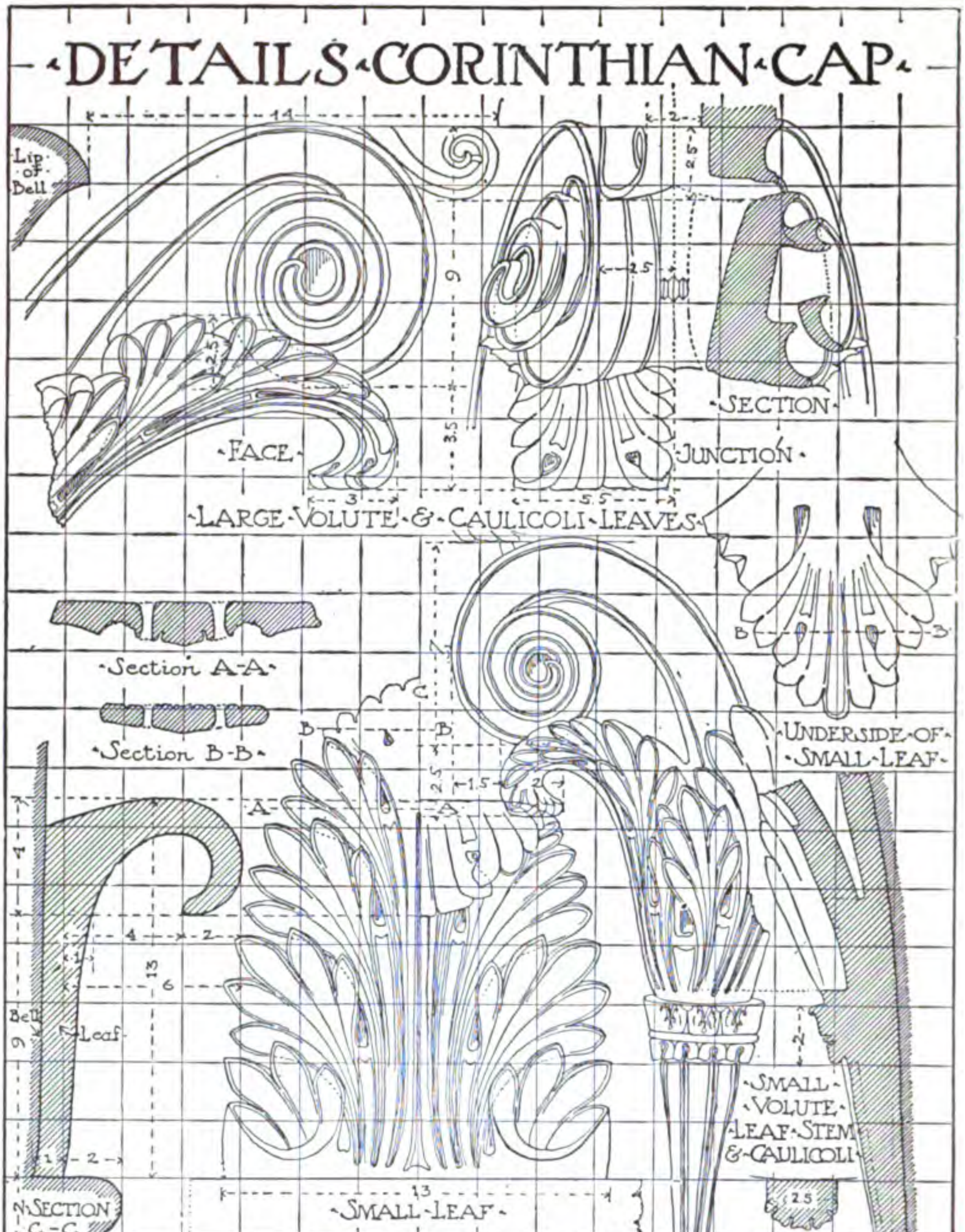


PLATE XVI.

(A reproduction at small size of Portfolio Plate XVI.)

89. The upper part of the Corinthian capital is a drum in the form of a bell whose upper edge is decorated with a curved moulding called the lip. The bell is forty parts in height; its lower diameter (directly above the astragal of the column) is thirty-four, —two parts less than the neck of the column,—and its upper diameter at the edge of the lip is forty-four. This difference of diameter forms a section or outline starting at the astragal and extending in a delicate curve up to the edge of the lip.

It is against this vase or bell that all the ornaments that have been detailed are attached. In order to draw each one in its own place in the general elevation—after having made the section, or profile, of the bell, with the astragal of the shaft—mark on a vertical line the height of the small leaf, thirteen parts; above this the height of the large leaf, twelve; then the distance above the large leaves up to the volute, six; next mark the height of the turn-over of the small and the large leaves, four; and the turnover of the caulicoli, three and five-tenths. Through all these different points draw horizontal lines across the width of the bell. All the projections are figured from verticals erected from the face of the column above the astragal. The small leaf projects six, the large one nine, the leaf of the caulicolus fifteen and five-tenths, and the volute seventeen.

90. In order to draw the elevation of the Corinthian capital it is necessary to consider first its outline as a section, and to lay out carefully, in plan, the arrangement of its leaf ornaments, as shown in Plate XVII. By means of this section and plan, the elevation may be exactly determined, after the individual parts, with their arrangement, are thoroughly understood.

91. The capital of the pilaster is composed of the same elements as that of the column; but as the plan of the pilaster is square the forms are slightly different; thus the vase, which is square at its base above the astragal, has convex faces; each face of the vase has two small leaves square in plan, and centering on perpendiculars at a distance of nine from the center line. Larger leaves are placed in the center of each face and at each angle. The abacus and other details are exactly similar to those of the capital of the column.

92. The Corinthian architrave (Plate XVIII) is thirty parts in height and divided into three bands; the first, five and five-tenths; second, six and five-tenths; and the third, seven and five-tenths. Between the first and the second there is a bead of one; between the second and the third, a cyma of two; above the third face there is a bead of one and five-tenths; cyma-reversa, three and five-tenths; and a fillet, two and five-tenths. The total projection of the architrave from the frieze is five and five-tenths.

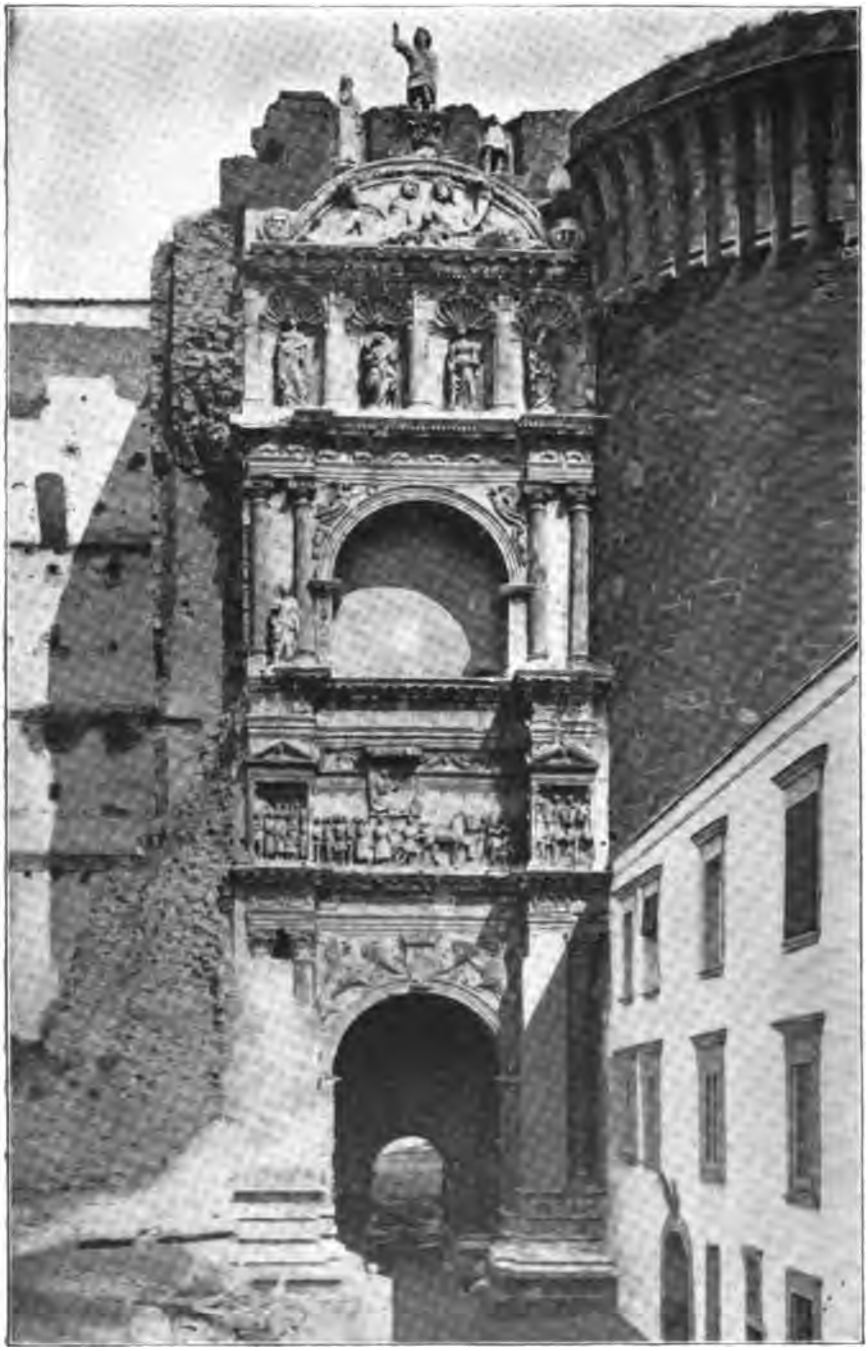
93. The frieze has the same height as the architrave and is terminated against the cornice by an astragal of one and five-tenths, of which five-tenths is for the fillet and one for the bead.

94. The Corinthian cornice has a total height of forty parts and its projection is equal to its height. It is divided thus: first, a cyma of three; second, a flat band of six and five-tenths, against which is placed a row of dentils five and five-tenths deep; third, an astragal one and five-tenths; fourth, a quarter-round three and five-tenths; fifth, a flat band of seven, against which are placed modillions six and five-tenths parts deep; sixth, a cyma of one and five-tenths which is mitred around the modillions and which crowns them; seventh, a corona of seven; eighth, a cyma of one and five-tenths; ninth, a fillet of one; tenth, a cyma-recta of five, and a fillet of two and five-tenths.

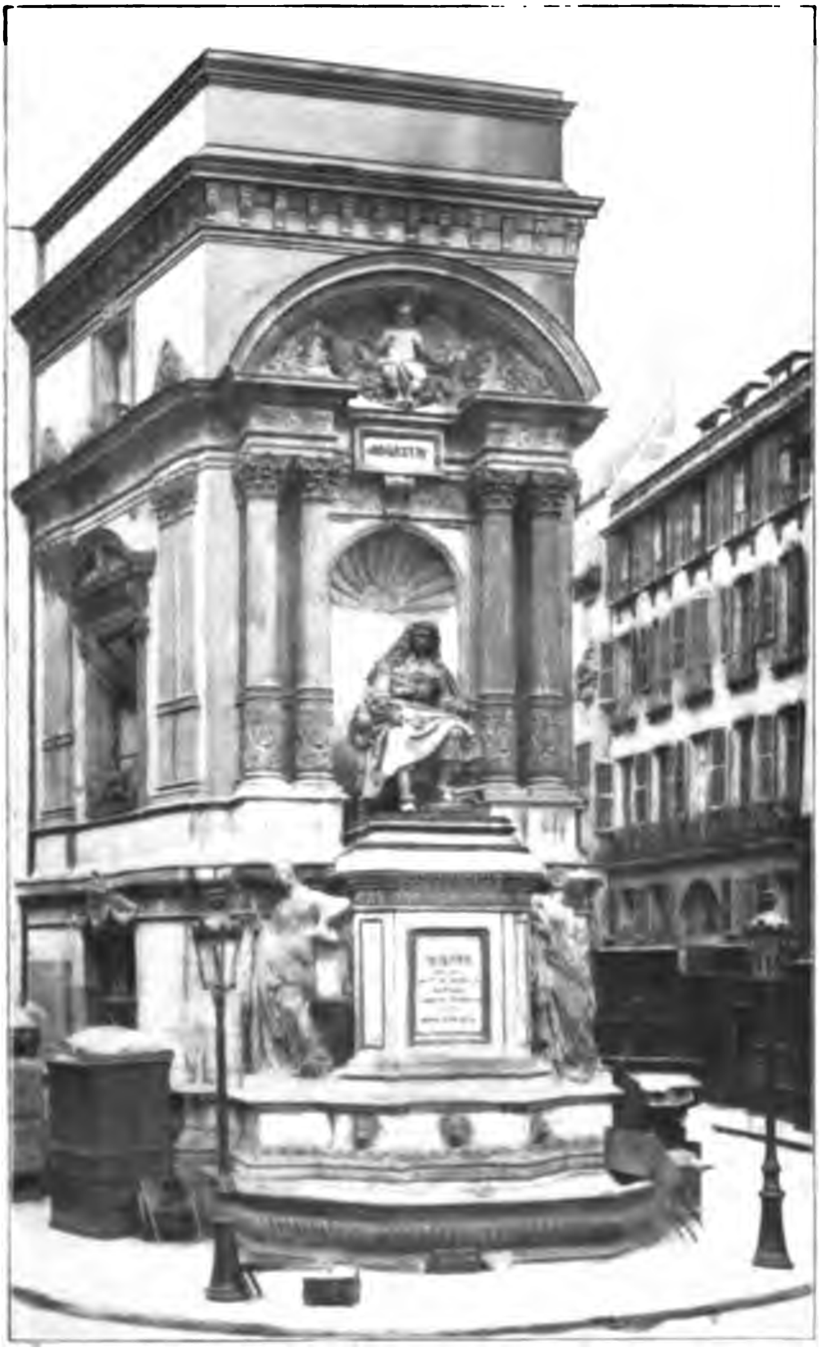
The total projection of forty is divided as follows: four parts for the cyma, four for the dentils, five for the astragal, the quarter-round, and the flat band of the modillions; eighteen for the modillions up to the lower angle of the cyma; one for the cyma reversa; one for the corona; two for the upper cyma and its listel; and five for the cyma-recta.

95. The cornice of the Corinthian order is distinguished by the consoles which support the corona and which are called modillions. The modillion is composed of two volutes or spirals similar to the keystone which we have already analyzed in Fig. 16, but while in the keystone the large spiral is found at the highest part, in the console it is at the back and attached to the face of the cornice.

The lower side of the modillion is covered by an ornamented leaf, whose head curves back against the smaller volute. The general proportions and curves of this leaf are indicated in Plate



TRIUMPHAL ARCH IN NAPLES, ITALY
Guiliano da Maiano, Architect.
Erected in 1470 in Honor of Alfonso d'Aragona.



FOUNTAIN OF MOLIERE, PARIS, FRANCE

Erected in 1844 to the Memory of the Celebrated Poet, Moliere, who Died in 1673 in a House Located near the Site of the Fountain. The Statue of Moliere, Above, is by Seurre. The Lower Statues, Representing Serious Comedy and Light Comedy, are by Pradier

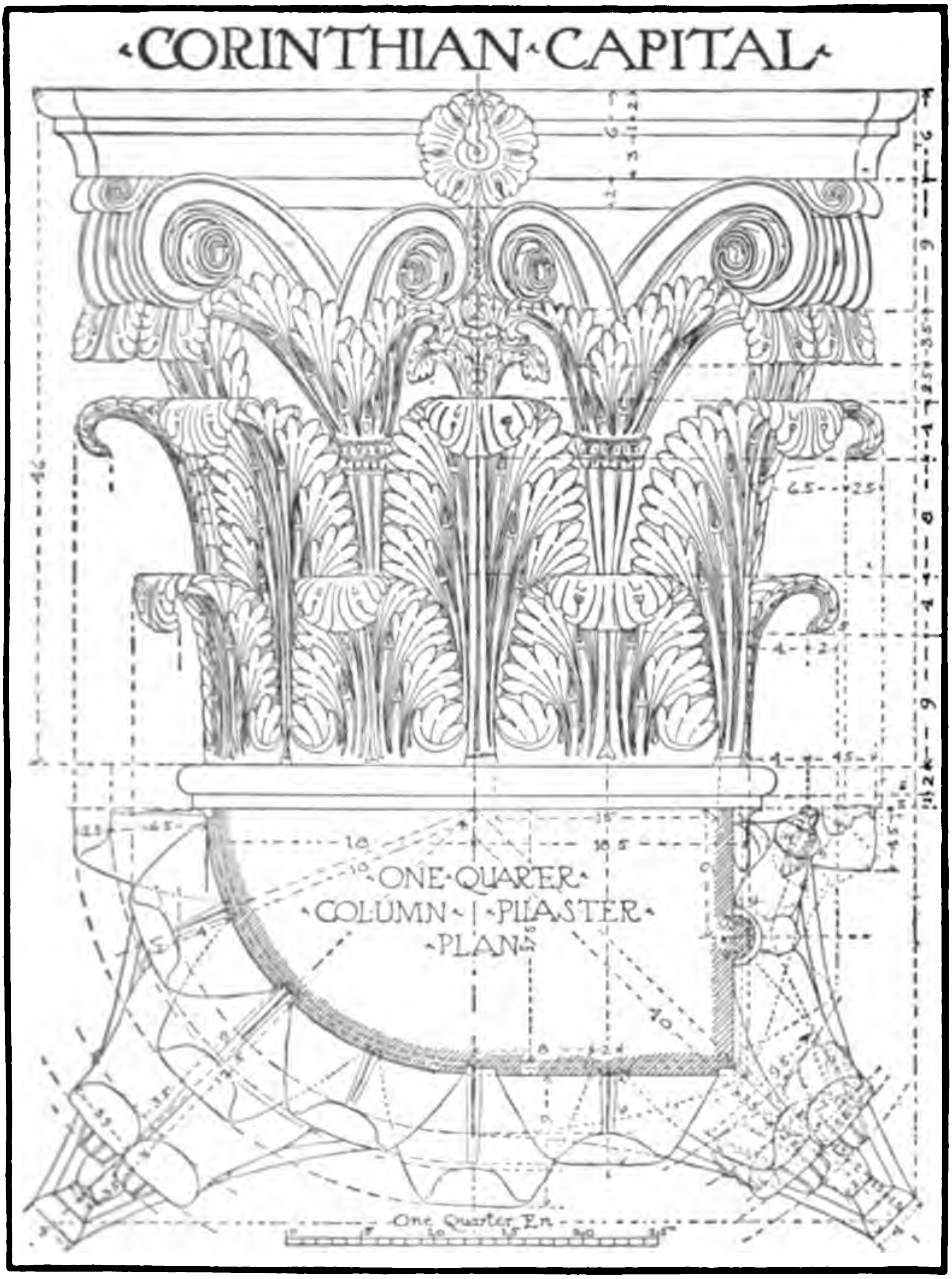


PLATE XVII.
(A reproduction at small size of Portfolio Plate XVII.)

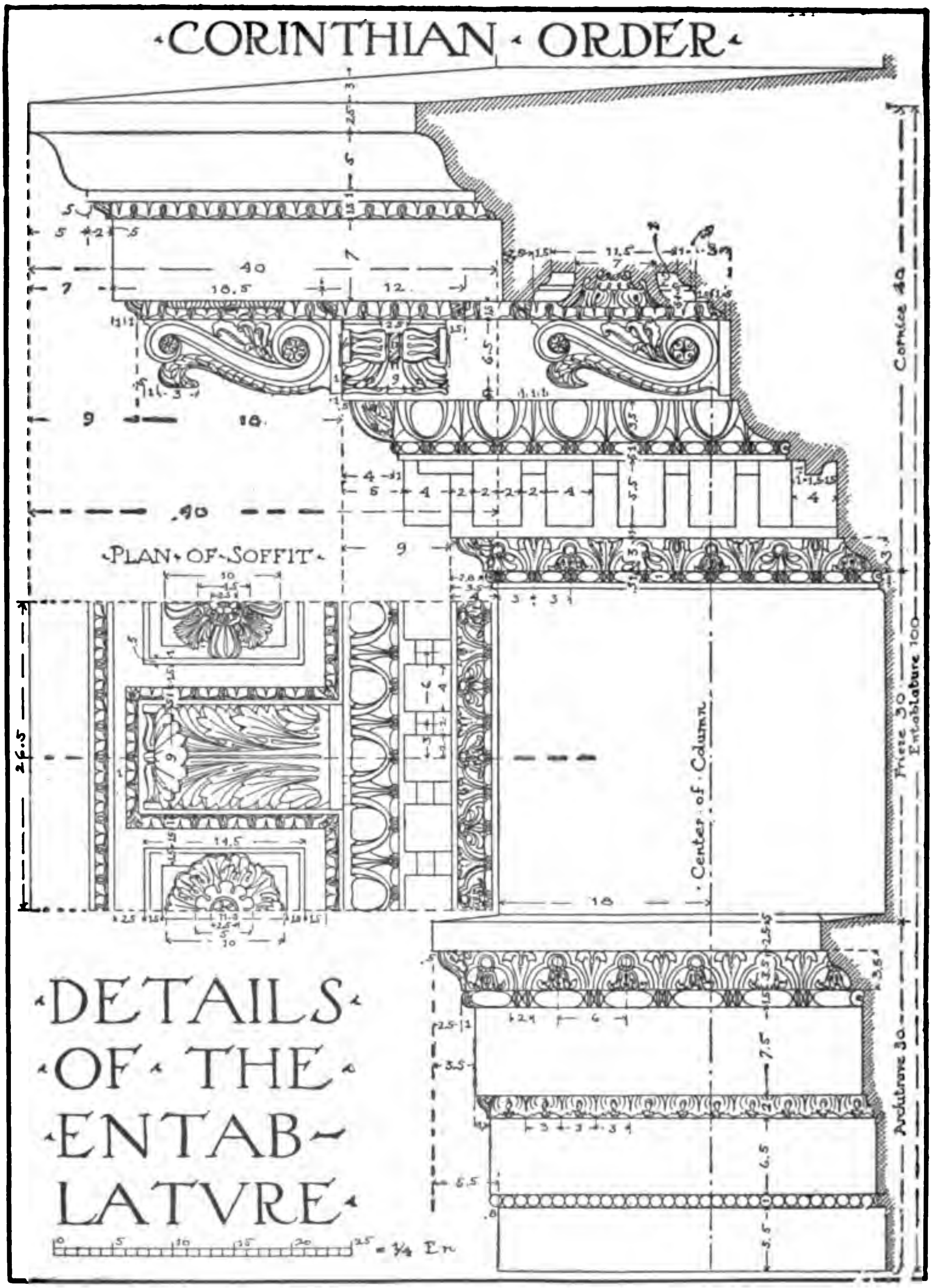


PLATE XVIII.

(A reproduction at small size of Portfolio Plate XVIII.)

XVIII. In practice, the console is drawn free-hand after laying out the general proportions.

The modillions are nine parts in width and are spaced seventeen and five-tenths apart or twenty-six and five-tenths from center to center; the dentils are four parts wide and are two apart. Against the cyma-recta very frequently is placed a row of masks in the form of lions' heads to serve as water spouts. These masks occur over the center of the modillions.

The soffit of the corona is ornamented between the modillions, with panels containing rosettes. (Fig. 14.)

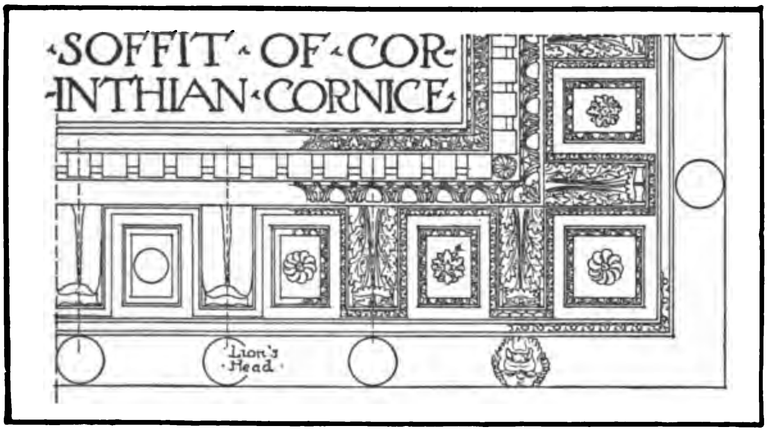


Fig. 14.

96. The base of the Corinthian Order (Plate XIX) is composed of a plinth, two torus mouldings, and two scotias separated by a double bead. Its total height is twenty-three, of which seven and five-tenths is for the plinth; five and five-tenths for the first torus; one for the fillet; one and five-tenths for the first scotia; two for the beads and their annulets; one and five-tenths for the second scotia; five-tenths for its listel; and three and five-tenths for the second torus.

The total projection of the base is eight; in this is included the congé of the column whose projection is one and five-tenths.

97. The cap of the pedestal is twenty parts in height divided among an astragal of two, a small frieze of five and five-tenths, second astragal of two, a cyma-recta of two and five-tenths, corona of five, a cyma-reversa of one and seven-tenths, and a fillet of one and three-tenths. The total projection of the cap from the die of the pedestal is eight.

The base of the pedestal is forty parts in height; it is composed of a first plinth of twenty-four, a second plinth of six, a torus of three and five-tenths, a reversed cyma-recta of three and five-tenths, with a fillet of one, a bead one and five-tenths, with a fillet of five-tenths. The total projection is seven and five-tenths, of which one is for the first plinth.

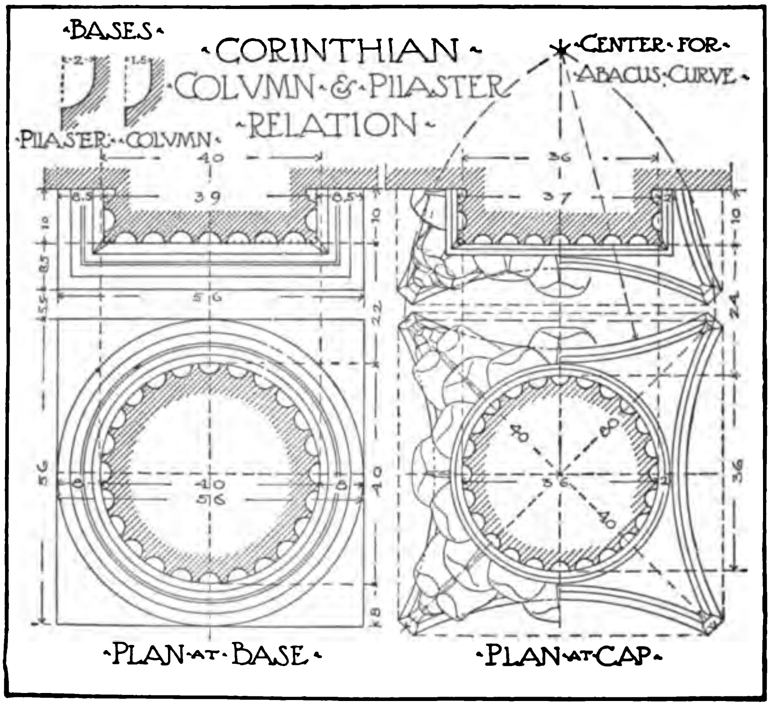


Fig. 15.

98. The impost is twenty parts in height and is composed of an astragal of two; frieze, five and five-tenths; fillet, five-tenths; bead, one; quarter-round, two and five-tenths; corona, five; cyma-reversa, two; and listel, one and five-tenths.

The total projection of the impost is seven, but for the arches between which a column with a pedestal is used, there is a greater projection of the corona of the impost. In this case the impost projection is eight.

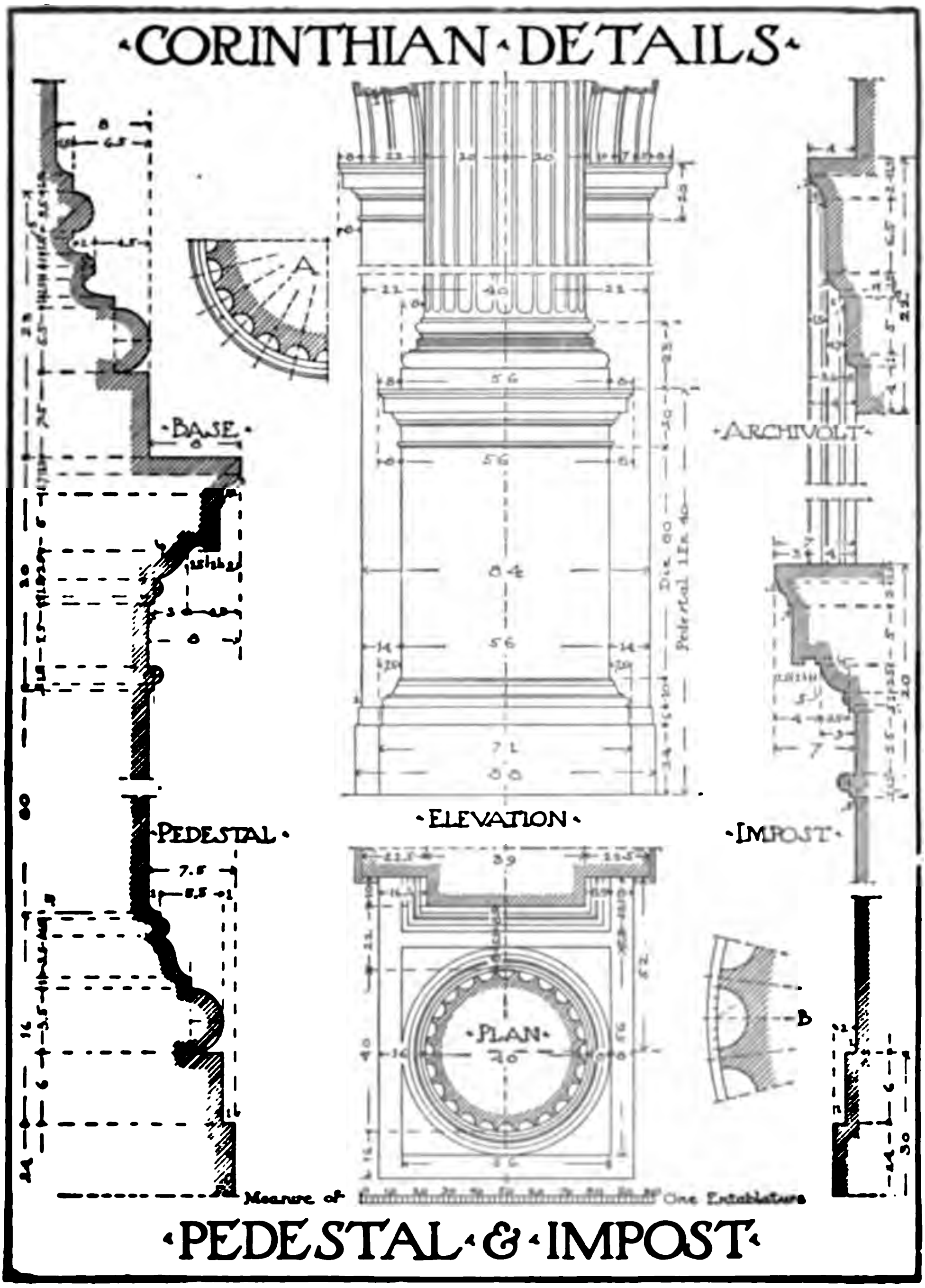


PLATE XIX.
(A reproduction at small size of Portfolio Plate XIX.)

99. The archivolt is composed of three fascias, a bead and quarter-round with a fillet, and a cyma-reversa with fillet. Its width is twenty-two parts; the first fascia four; bead one; second fascia five; fillet five-tenths; quarter-round one and five-tenths; third fascia six and five-tenths; cyma two; and fillet one and five-tenths. The total projection is four.

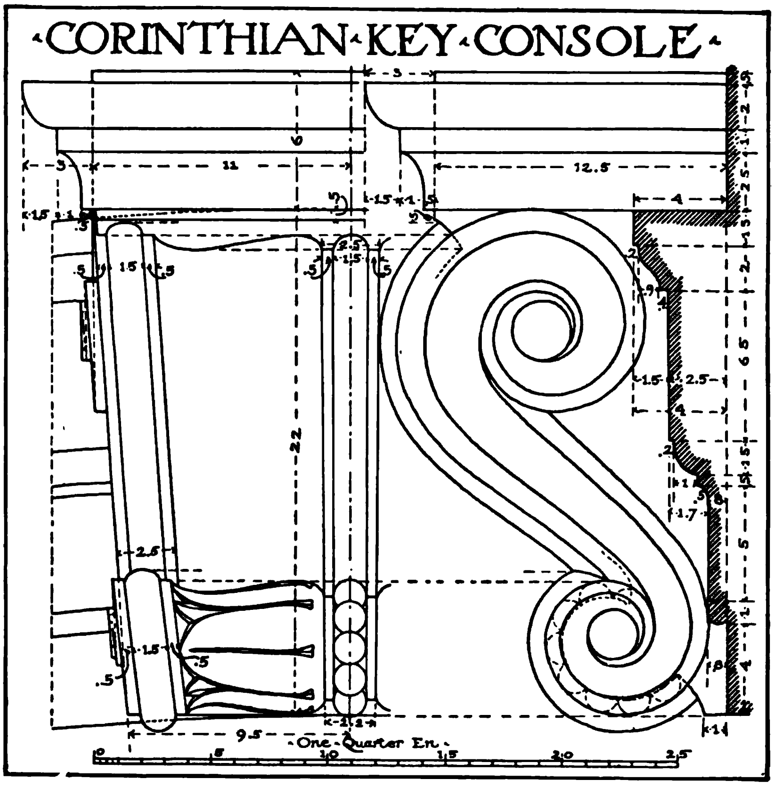


Fig. 16.

100. The channels of the Corinthian column are twenty-four in number. The width of the fillet which separates them is one-third of the channel width. The width of a pier of the arcade is equal to the width of a column plus two archivolts which is eighty-four parts.

101. The Corinthian pilaster and column relation is shown in Fig. 15: the pilaster width at the base is thirty-nine; at the

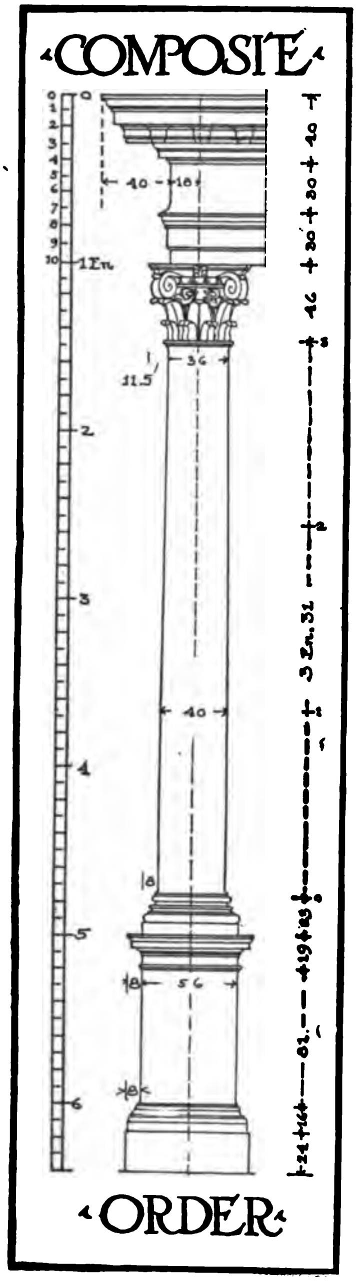


Fig. 17.

height of the capital it is thirty-seven. The width of the pilaster differs from the diameter of the column, being one part less at the base and one more at the height of the capital. The base of the pilaster projects eight and five-tenths so that the total width may be equal to that at the base of the column. The width of the abacus of the pilaster capital is equal to that of the capital of the column.

102. When the pilaster is channeled, there is formed at each angle a bead of one part and the remaining width is divided into twenty-nine equal spaces which in turn are divided into seven channels of three spaces, and eight fillets of one space each. The summits and the bases of the channels correspond to the starting point of the congés.

This rule for fluting of columns and pilasters is also applicable to the Ionic Order.

103. The drawing of the keystone console of the Corinthian arch as shown in Fig. 16 is a little different from that of the Ionic Order, but is drawn in accordance with the same rules.

THE COMPOSITE ORDER.

104. The Composite capital (Fig. 17) is a mixture of elements of the Ionic and Corinthian capitals. Its forms and general proportions are like those of the Corinthian Order. There are two banks of leaves placed as in the Corinthian, but the upper part is

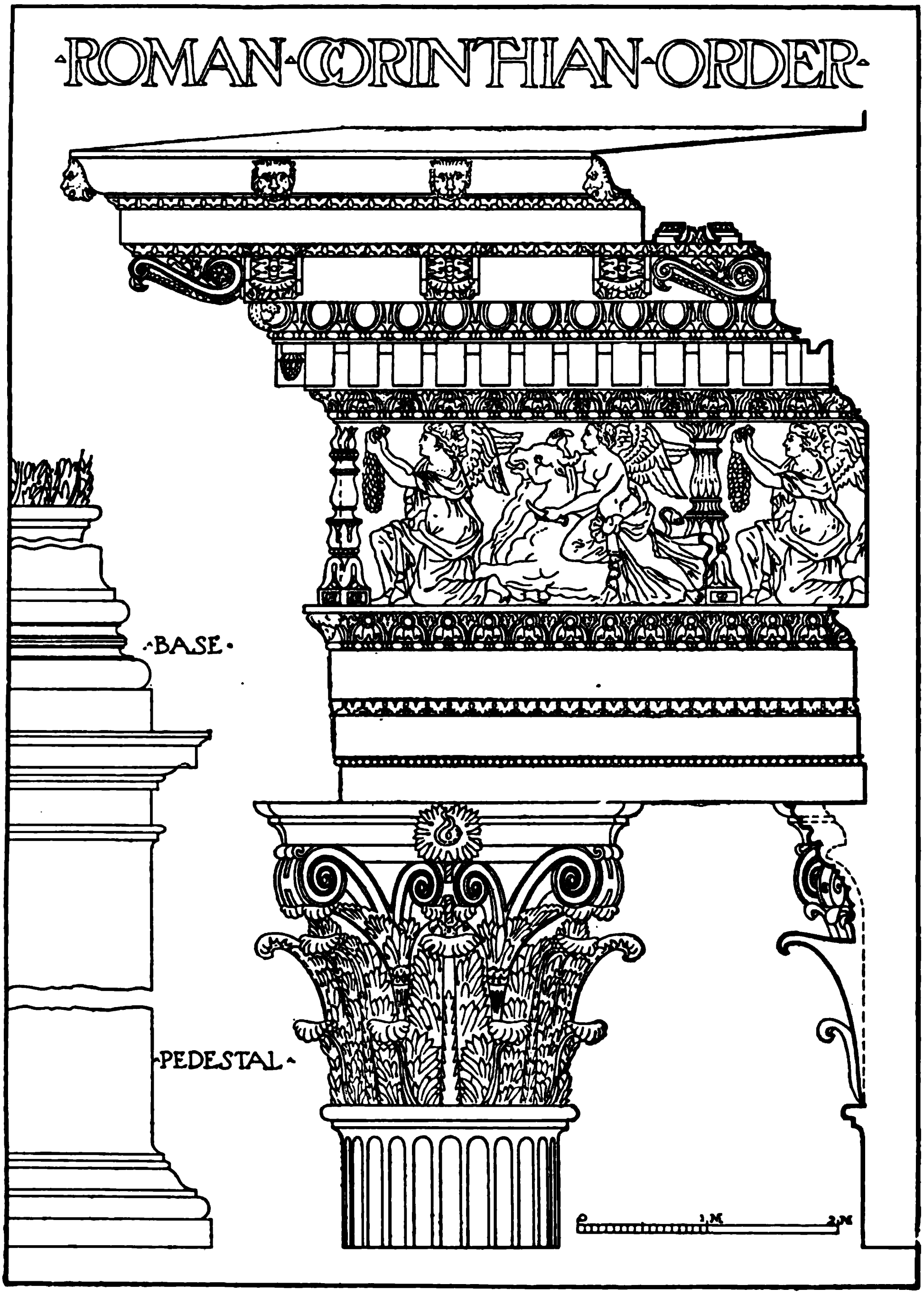


PLATE XX.

A reproduction at small size of Portfolio Plate XX.)

in the form of an Ionic capital whose volutes are placed on the angles.

105. The general proportions of the Composite entablature are the same as those of the Corinthian, but their details are appreciably different in the cornice, where the modillions are replaced by a sort of double mutule having two fascias.

106. We have now arrived at the close of the analysis of all the details which enter into the composition of the three Orders of Classical Architecture, and it will be advisable to take up briefly the consideration of their use in relation to each other, especially in regard to the principles governing their intercolumniation and superposition.

INTERCOLUMNIATION.

107. Intercolumniation is the spacing of columns *in the clear*, especially of columns arranged in the form of a colonnade. When a figured dimension refers to the spacing it is invariably one diameter less than the distance from center to center of columns.

108. Superposition has reference to the use of the orders in two or more stories, when certain general principles always apply, as will be shown.

109. A colonnade is a row of columns spaced regularly and connected by an entablature. The space which separates these columns is called the intercolumniation. When the colonnade is composed of two or more rows of columns and the space which they enclose is covered and serves as a covered porch or entrance to a building, this porch is called a portico, and it is often crowned with a gable or pediment above the columns. Usually one side of a portico is closed by a wall, and sometimes three sides are so closed; in such a case the columns at the angles are replaced by pilasters to which the side walls are attached. Pilasters which are employed in this manner are called antae, and a portico of this kind is a portico "in antis." The term "antae" is more generally employed in Greek work and the term "pilaster" is used in Roman architecture.

110. When the portico is employed as a porch in front of an edifice, the columns are generally of an even number, and the spaces of uneven number, in order to have a space in the center opposite the door-way of the building. Even when an entrance is not placed behind the center of a colonnade it is considered in better taste to place the columns or arches so that a support does not come in the center of any such arrangement. When a pediment is placed over columns this rule is even more strictly followed. Occasionally, usage determines that the intercolumniations of a portico shall be unequal so that the central opening may be wider than the others, in order that the approach to the entrance to the building may be more ample.

111. The intercolumniation of the Roman Doric order is determined more or less by the fact that the columns are invariably placed directly under the triglyphs. It will be found difficult to space two columns under two adjacent triglyphs, because the bases and caps of the columns will overlap each other. Still, they may be so placed by enlarging the spaces between the triglyphs or reducing the projection of the cap and base, or both. It is not often that circumstances would justify such an alteration in the order to effect a close spacing of columns. When the columns are set under alternate triglyphs they are spaced about two and one-half diameters on centers. The intercolumniation is then one and one-half diameters, or as it is termed "monotriglyphic" or "pycnostyle," (Fig. 18). The width of the intercolumniations (spaces between columns) of a portico should seldom be less than one and one-half times the diameter of the column, and in old work it will rarely be found to exceed two and one-half diameters. In modern practice as in exceptional cases in

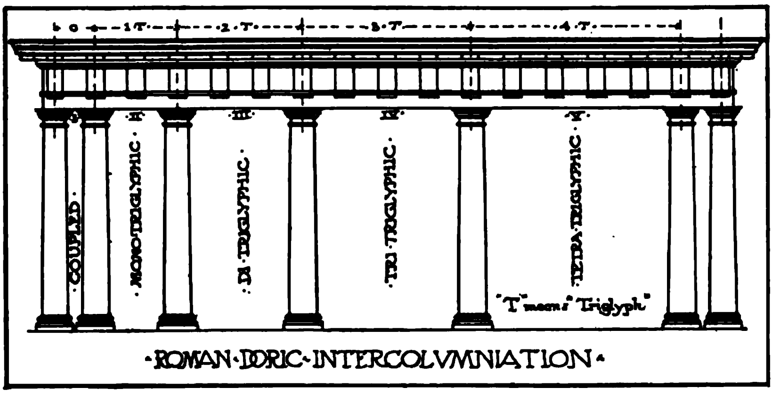


Fig. 18.

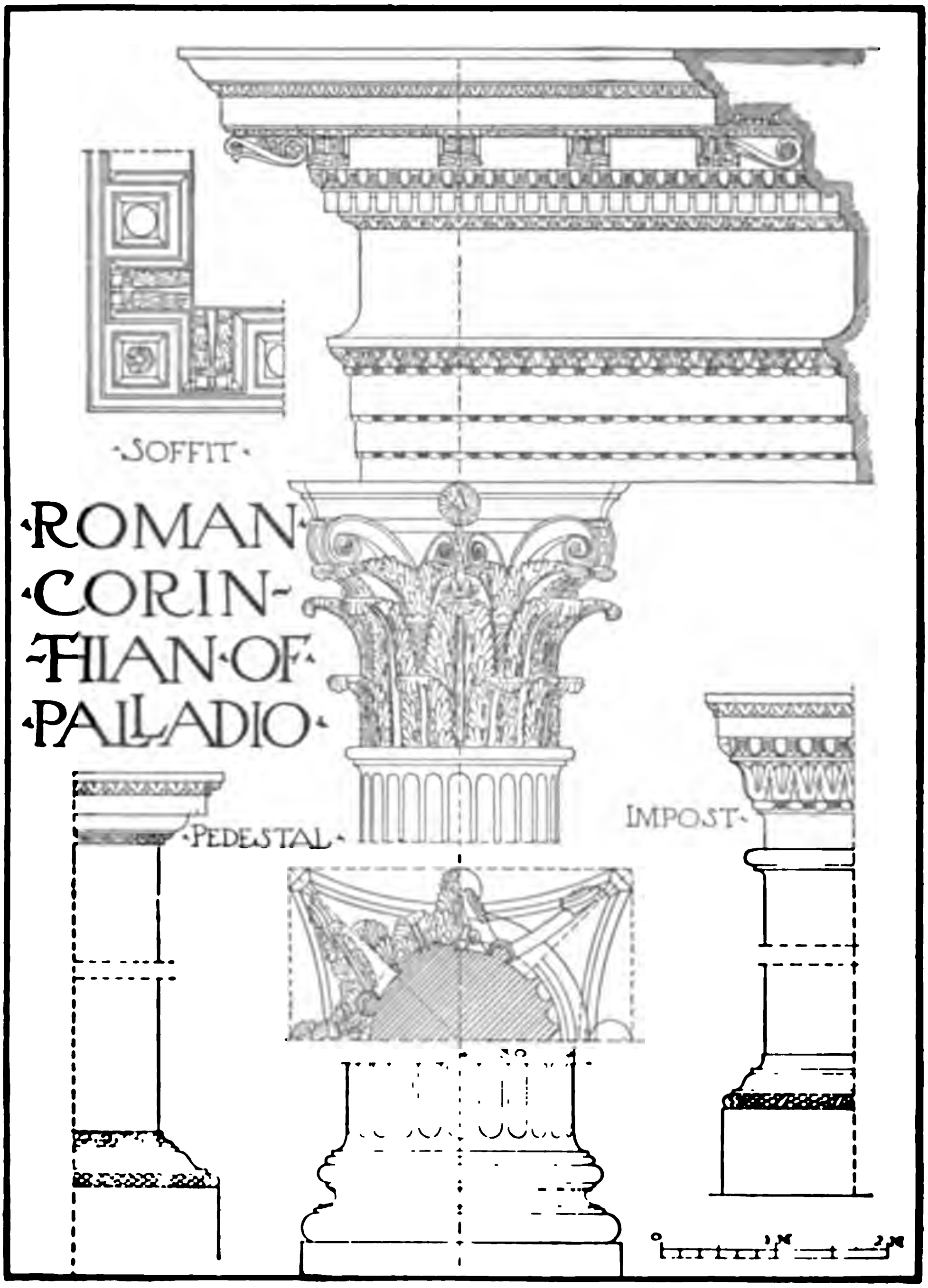


PLATE XXI.
(A reproduction at small size of Portfolio Plate XXI.)

ancient work, this spacing is, however, exceeded. When two triglyphs occur over the opening between the columns the intercolumniation is about two and three-fourths diameters, and is called "ditriglyphic." Too great an intercolumniation produces a bad effect in all the orders. However, when the order is executed in wood a much wider spacing is often employed.

112. In the spacing of columns other than in Doric Order there is no such special requirement as to the location of the column under any particular part of the entablature, although where modillions or brackets are used they should be so spaced as to come over the axes of the columns. Such modillions or brackets are, however, easily varied slightly in spacing or location, so that the system of intercolumniation in any other than the Doric Order is generally determined only by the diameter and height of the columns themselves. Columns are referred to as "coupled" when they are so placed that the bases or caps just avoid touching. This would space them about one-third to one-half their diameter apart, which is the least spacing that the outline of the column itself will allow. The various spacings of columns are generally termed coupled, pycnostyle, systyle, eustyle, diastyle, and arœostyle according as they are placed close together or are separated by 1, 1½, 2, 2¼, 3 or 4 diameters. (Fig. 19.) The spacing of the coupled

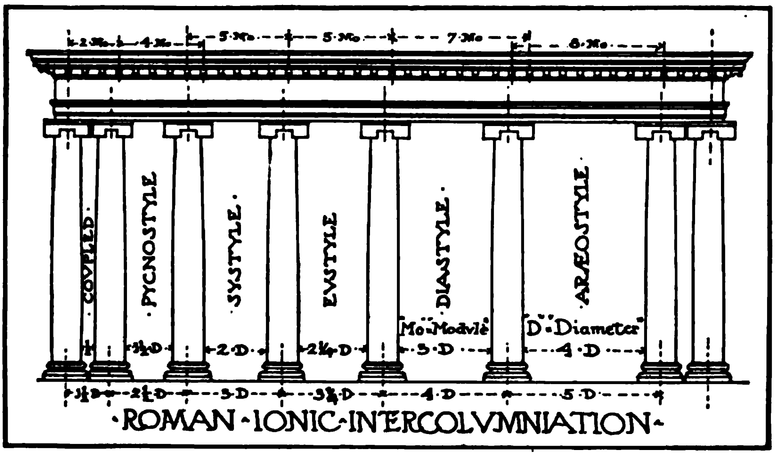


Fig. 19.

columns we have already explained. The pycnostyle intercolumniation varies from one and one-quarter to one and one-half diameters. The systyle intercolumniation has two diameters which in modern work would often seem too little. The eustyle has two and one-quarter diameters between the columns; or, as is sometimes preferred in modern practice, two and one-third diameters as in the Ionic and Corinthian orders. This corresponds more exactly to the customary spacing of dentils and modillions.

113. Closer intercolumniations are generally used on monumental work of large scale, while that of a more domestic character requires a wider spacing of columns for practical utilitarian purposes. During the Renaissance, the custom of placing columns in couples and taking each couple as a unit for working out the colonnade, was first adopted and has since, especially in France, been much employed. In modern practice the columns are placed less by rule than to satisfy the eye and the judgment of the designer. It must be remembered, however, that the axes of the columns must always be in accord with certain members of the entablature above, such as the triglyphs, dentils, or modillions, and also that, under a pediment, the columns themselves should be even in number.

114. A portico forming the front facade of an edifice, when there are not more than seven intercolumniations, may be crowned by a triangular gable or pediment which forms the roof of the porch.

115. A pediment is placed above the cornice of the entablature and is formed by two sloping cornices which are joined at the angles to the horizontal cornice. The crowning cyma-recta or cavetto follows the sloping cornice and is omitted from the horizontal cornice below the face of the pediment. The triangular face which is found between the three cornices corresponds in plane with the frieze of the entablature and is called the "tympanum" of the pediment.

The height of a pediment is determined as follows. In Fig. 20 let A be the point in which the axis of the pediment intersects the highest line of the horizontal cornice. With this point as a center and with a radius equal to one-half the width of the pediment, draw a semi-circle below the pediment as shown in the figure. This

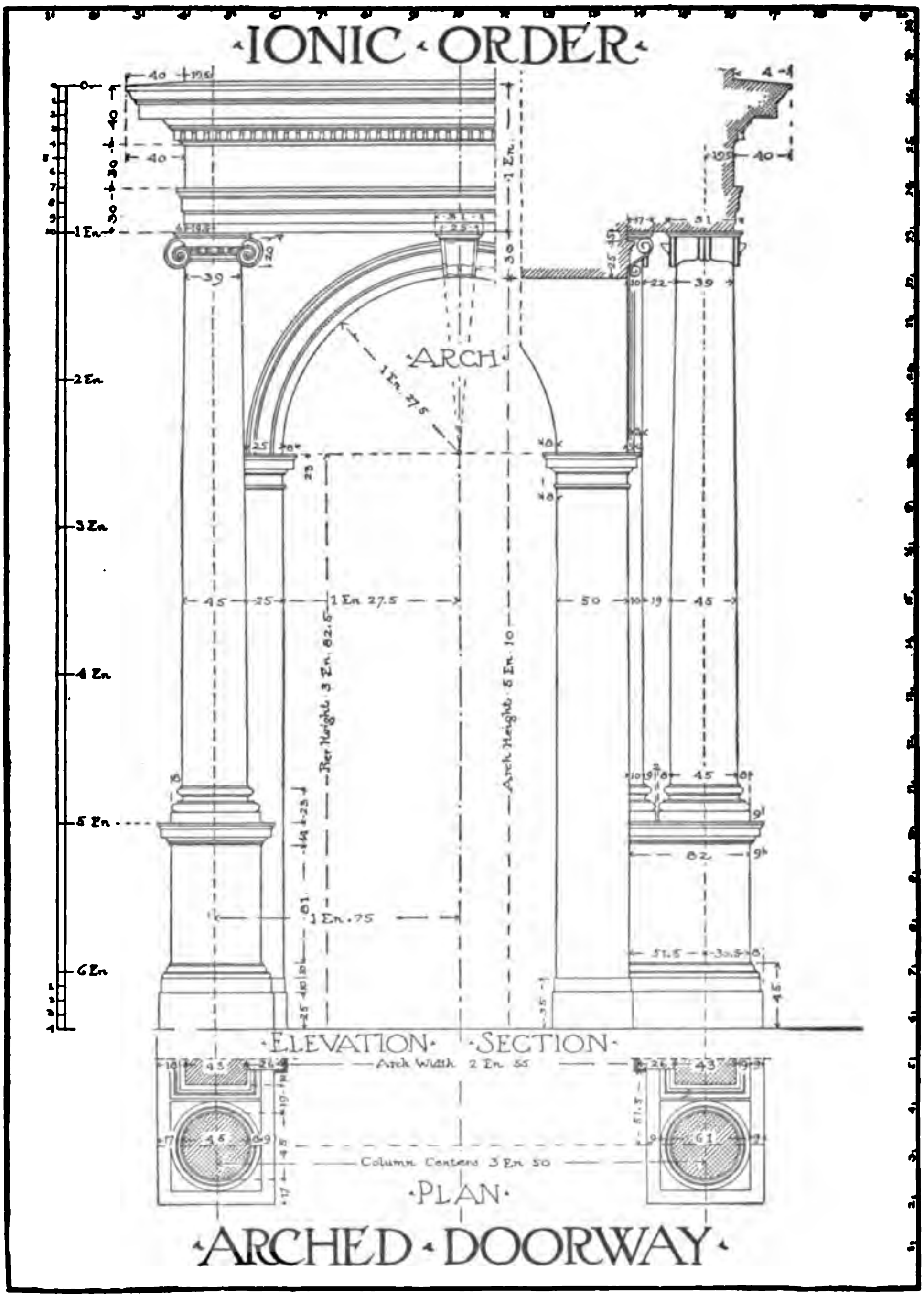


PLATE XXII.

(A reproduction at small size of Portfolio Plate XXII.)

semi-circle intersects the axis of the pediment at the point B. With B as a center and with a radius equal to the distance from B to C (the extreme outside point of the horizontal cornice) draw an arc above the cornice. The point D, in which this arc intersects the axis, will be the highest point or "peak" of the pediment. Draw the lines DC and DE and the outline of the pediment will be complete.

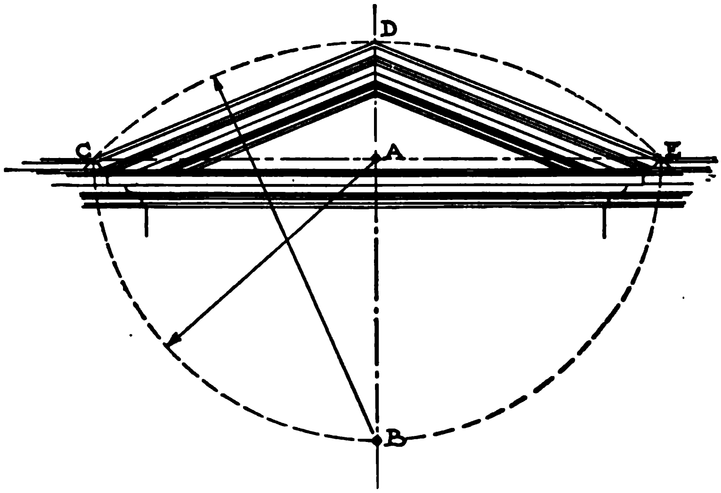


Fig. 20.

In plate XXXIII is represented a portico of the Ionic Order with three intercolumniations which forms the front of an edifice intended for a hall or temple. The plan is a parallelogram of which the front or portico occupies one of the smaller sides.

SUPERPOSITION OF THE ORDERS.

116. The principles governing superposition, or the use of orders one above the other, as we find them in many of the Roman and Renaissance buildings, is that the natural method is followed in placing a lighter and apparently more delicate order above one of greater strength. For instance, the Tuscan should never be other than the lowest order, and the Doric should be placed above this. As we have already seen, however, the Tuscan Order may better be omitted and the Doric Order may be placed in the lowest story with the Ionic and Corinthian above in the order named.

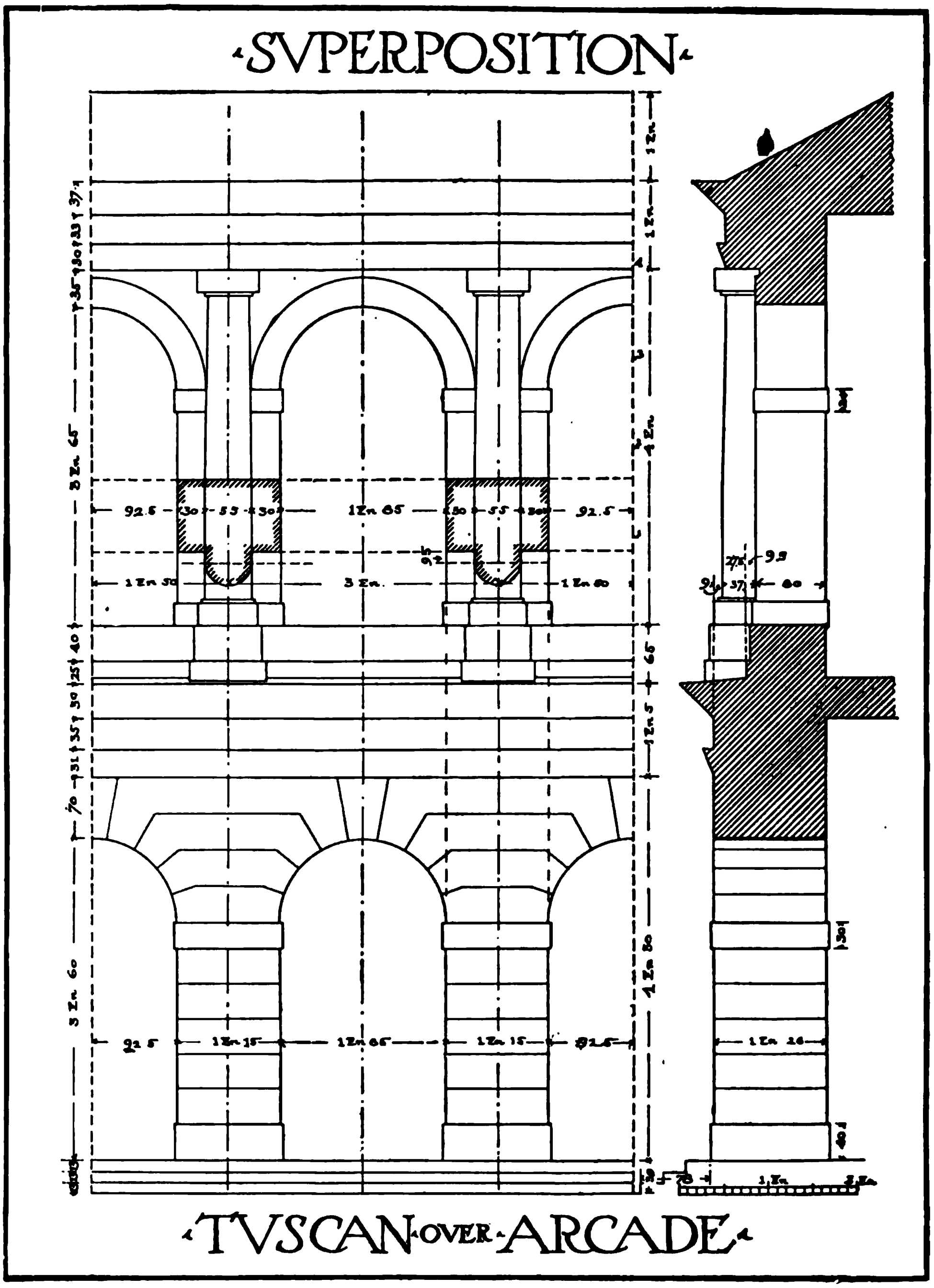
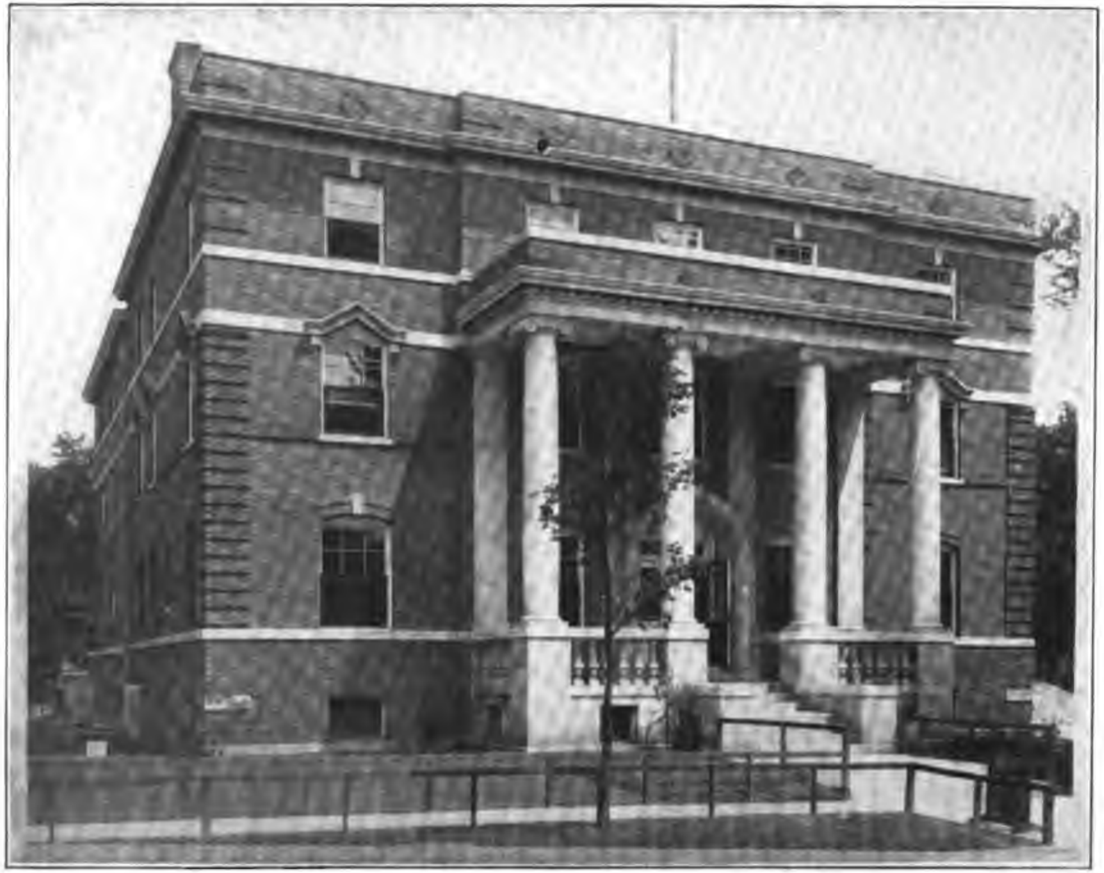
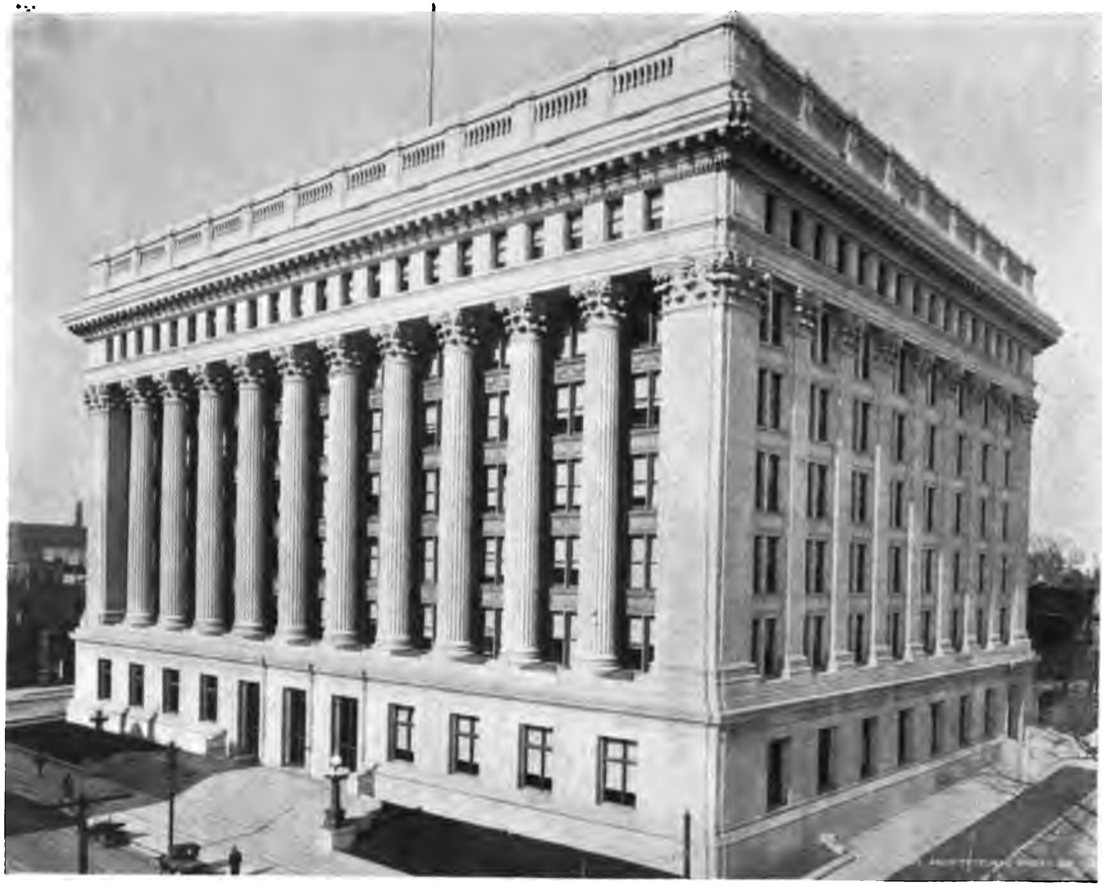

SVPERPOSITION
TVSCAN OVER ARCADE
92.5
30
55
30
1 En 65
3 En.
1 En 50
3 En 65
4 En
65
3 En 60
4 En 80
1 En 15
1 En 26

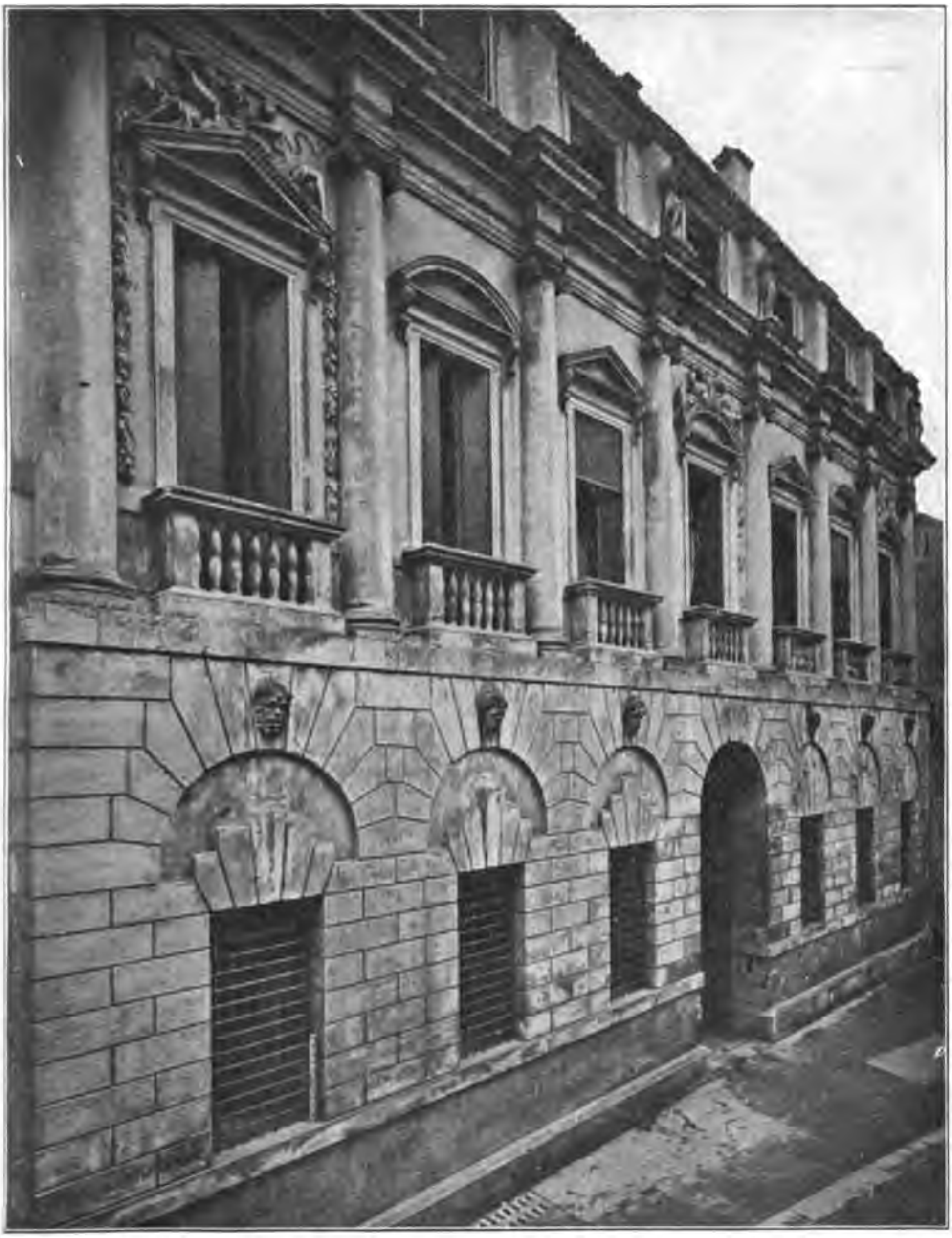
Fig. 21.



YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING, OAK PARK, ILLINOIS
Pond and Pond, Architects, Chicago
Walls of cherry red paving brick, trimmed with purple red paving brick
Columns, string-courses, etc., of Bedford stone



NORTHWESTERN MUTUAL LIFE INSURANCE BUILDING, MILWAUKEE, WISCONSIN
Marshall and Fox, Architects, Chicago



Colleoni-Porto Palace, Vicenza, Italy; Andrea Palladio, Architect.
A Renaissance example of the placing of an Order above an arcade.

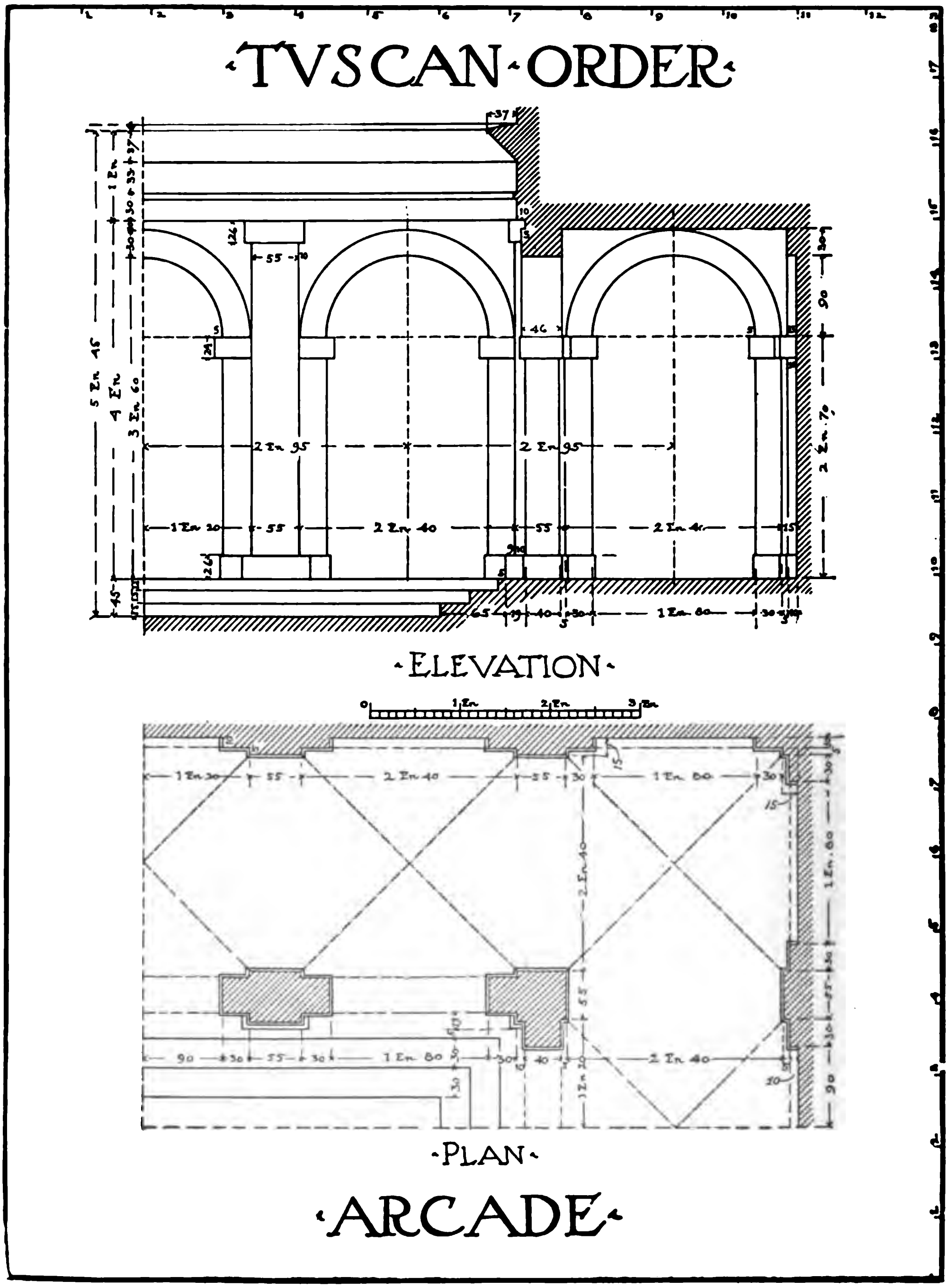
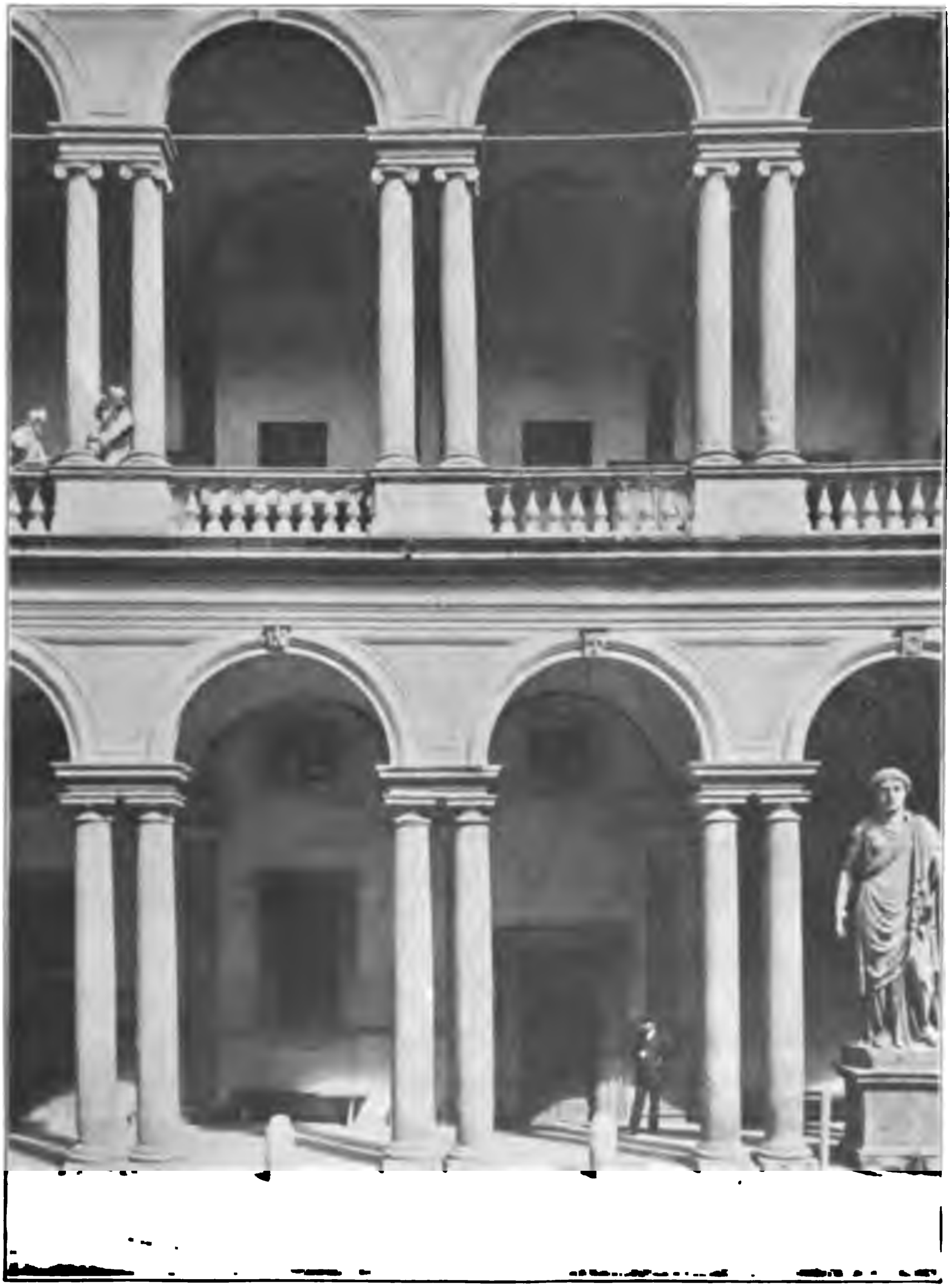


PLATE XXIII.
(A reproduction at small size of Portfolio Plate XXIII.)



Detail of Courtyard, Borghese Palace, Rome; Martino Longhi, Architect.
Showing Renaissance superposition of arches resting on coupled columns

117. It sometimes happens that the same order is employed in two different stories, in which case the upper example should be more slender and of less diameter than that below. This rule holds good for any superposition of the orders. Usually the base diameter of the shaft above is the same as the diameter at the neck of the shaft below. In section, or in side elevation, it is the practice to make each order recede slightly from the face of the one below. In other words, the base or square plinth beneath the column in the upper story should be plumb with the face of the frieze of the order of the story below. This gives an appearance of stability which is quite appreciable and prevents the upper orders from seeming to overpower and overweigh the orders below.

118. If columns are coupled and set exactly over each other, there is slight tendency for the space between the columns in the upper story to seem too wide. This may be avoided by taking the center line of the space between the lowest couple and then draw the columns in toward each other on each successive story; keeping them in the same relation to each other and equally spaced on each side of the center line.

119. Facades of edifices of two stories sometimes have an order occupying the whole height of the upper story, the lower story being treated as a pedestal for this order. An example of this combination is seen in Fig. 21. The lower story or ground floor, raised on three steps, is composed of an arcade crowned by an entablature to which may be applied the details of the Tuscan order. Above this entablature is a Tuscan or a Doric order with arches whose axes correspond to those of the lower arches. This order is raised on a double plinth which forms the base of the arcade.

120. The use of an order in the upper story of a two-storied facade offers few difficulties and generally produces a good effect; the proportional height of the base to the order which surmounts it depends entirely on the height of the stories. In this plate the height of the ground story of the facade has been assumed to be six entablatures of the second-story order.

121. The succeeding plates offer an opportunity to study the various methods and combinations in which columns attached to a wall, and called "engaged columns," are used. Such columns were much employed by the ancient Romans in a manner which modern architects have frequently imitated. The engaged columns form a projecting part that in certain instances adds greatly to the perspective effect of a facade, and sometimes serves also as an additional support; but in many instances pilasters would be preferable, especially on the angles of a building. The columns are generally engaged in the walls for from one-third to one-quarter of their diameter.

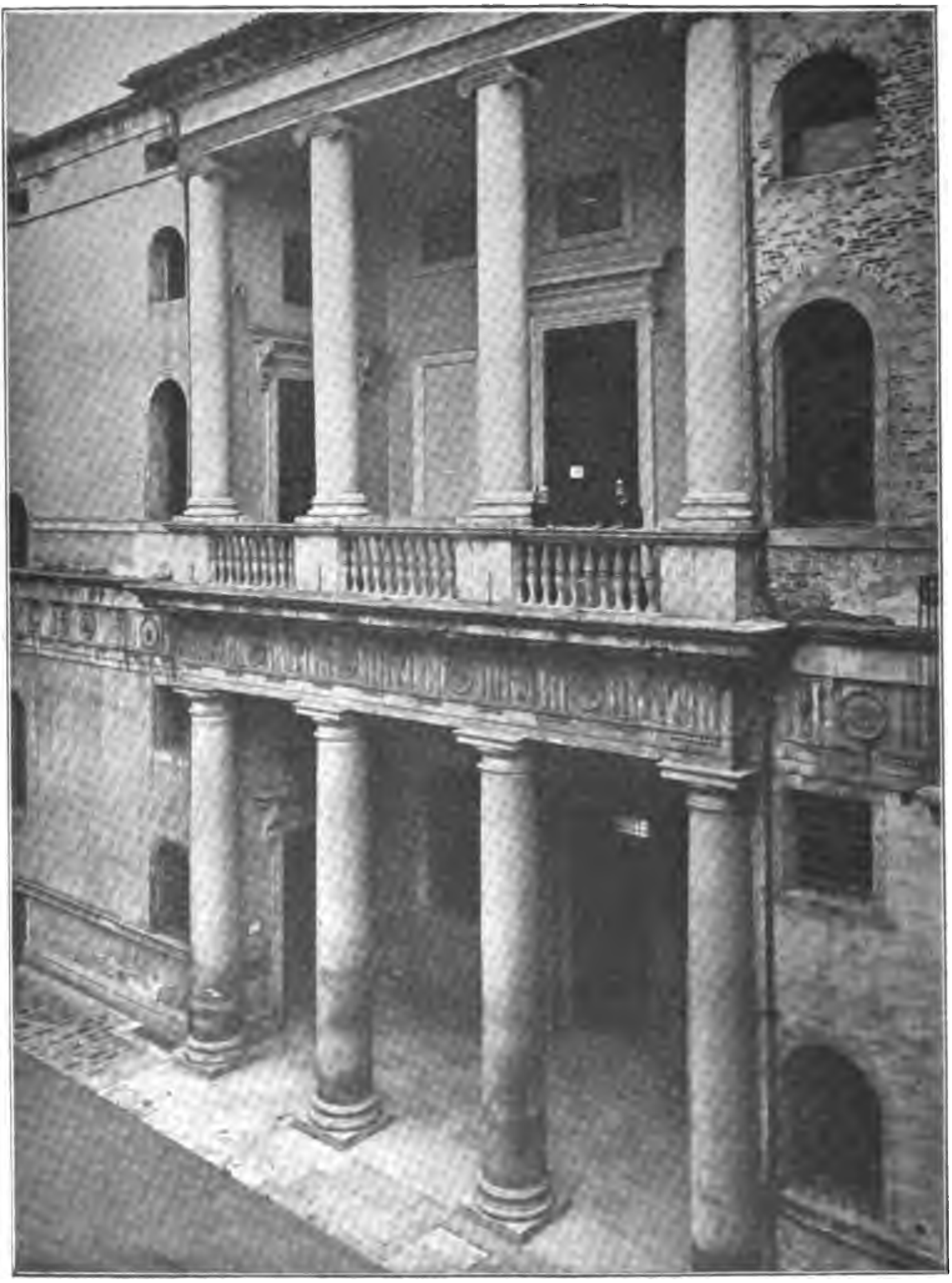
122. The Romans have also left famous examples of superposition of the orders in the facades of their theatres and amphitheatres, although such a combination is not considered as effective as an order superposed on an arcade, as in Fig. 21.

123. It has been explained that the lower order in a superposition should be a little larger than the one next above it. In Fig. 22 the height of the upper columns is three entablatures seventy-five parts of the lower order, whose columns are four entablatures in height (as is shown by the figures at the left-hand margin).

The same rules have been observed in the two exercises that follow. The Ionic order, placed above the Doric in Fig. 23 is a little smaller than the Doric; the height of the column being but three Ens seventy-five parts of the lower order. The Corinthian column placed on the Ionic in Fig. 24 has but three Ens seventy parts of the height of the Ionic. This will give in each instance for the column of the upper order a lower diameter that is substantially the same as the upper diameter of the column over which it is placed. At the same time the height of the second story, as well as the arches and column there used, is reduced proportionally, unless the column shafts be attenuated beyond the rule here employed

124. Taking the height of three entablatures and seventy-five parts of the first story order, for the total height of the columns in the second-story order in Fig. 22 by re-dividing that height into four parts, it is easy to ascertain the height of the second-story entablature in relation to the column with which it is used.

125. In elevation it will be seen that the piers of the second story (Fig. 22) are not as wide as those of the story below,



Chieregati Palace, Vicenza, Italy; Andrea Palladio, Architect.
Detail of courtyard façade, showing Renaissance use of Ionic over Doric Order, both being of exceptionally refined and Classic proportions.
(Compare with detail of Theater of Marcellus opposite page 198.)

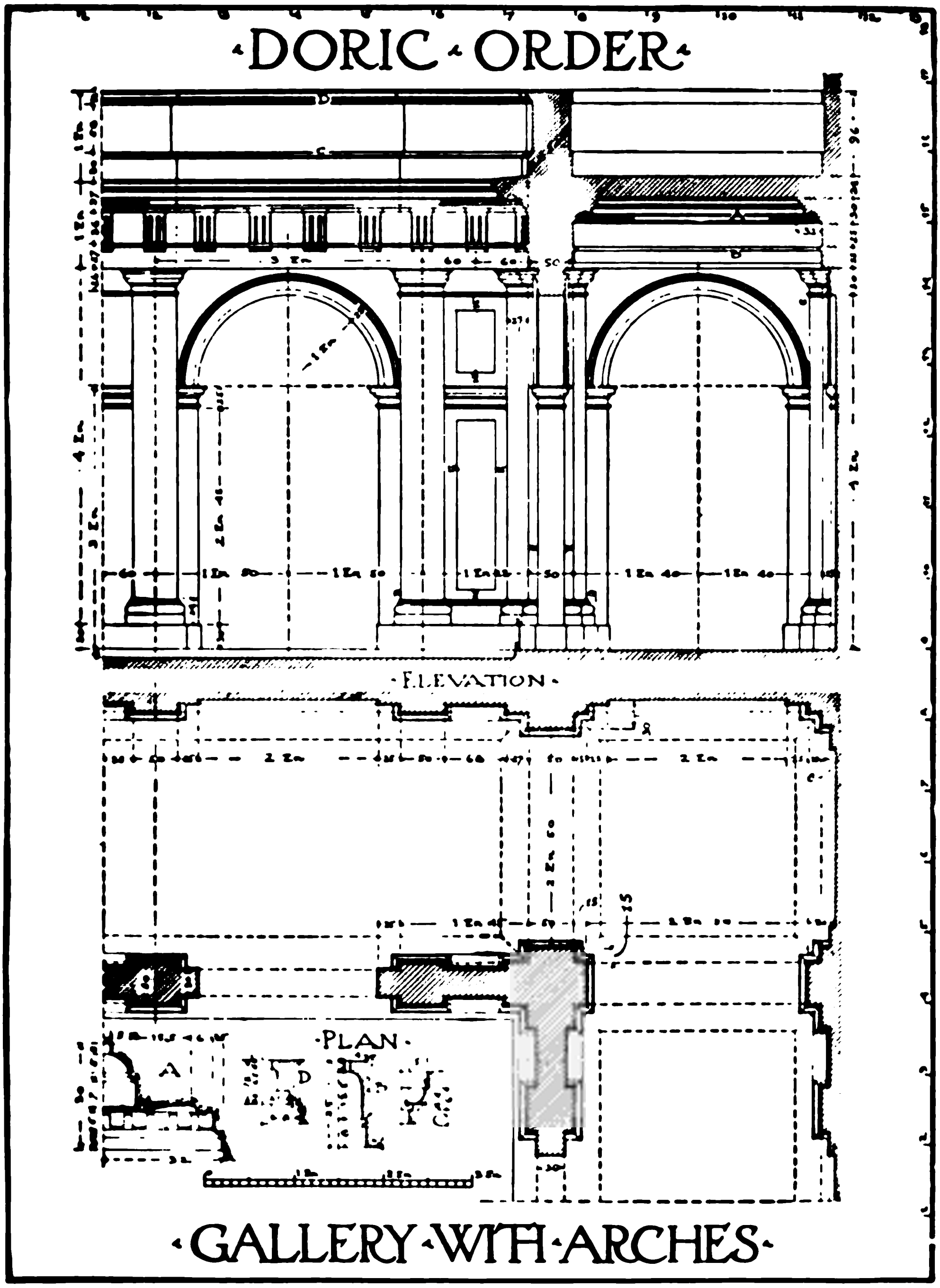


PLATE XXIV.
(A reproduction at small size of Portfolio Plate XXIV.)

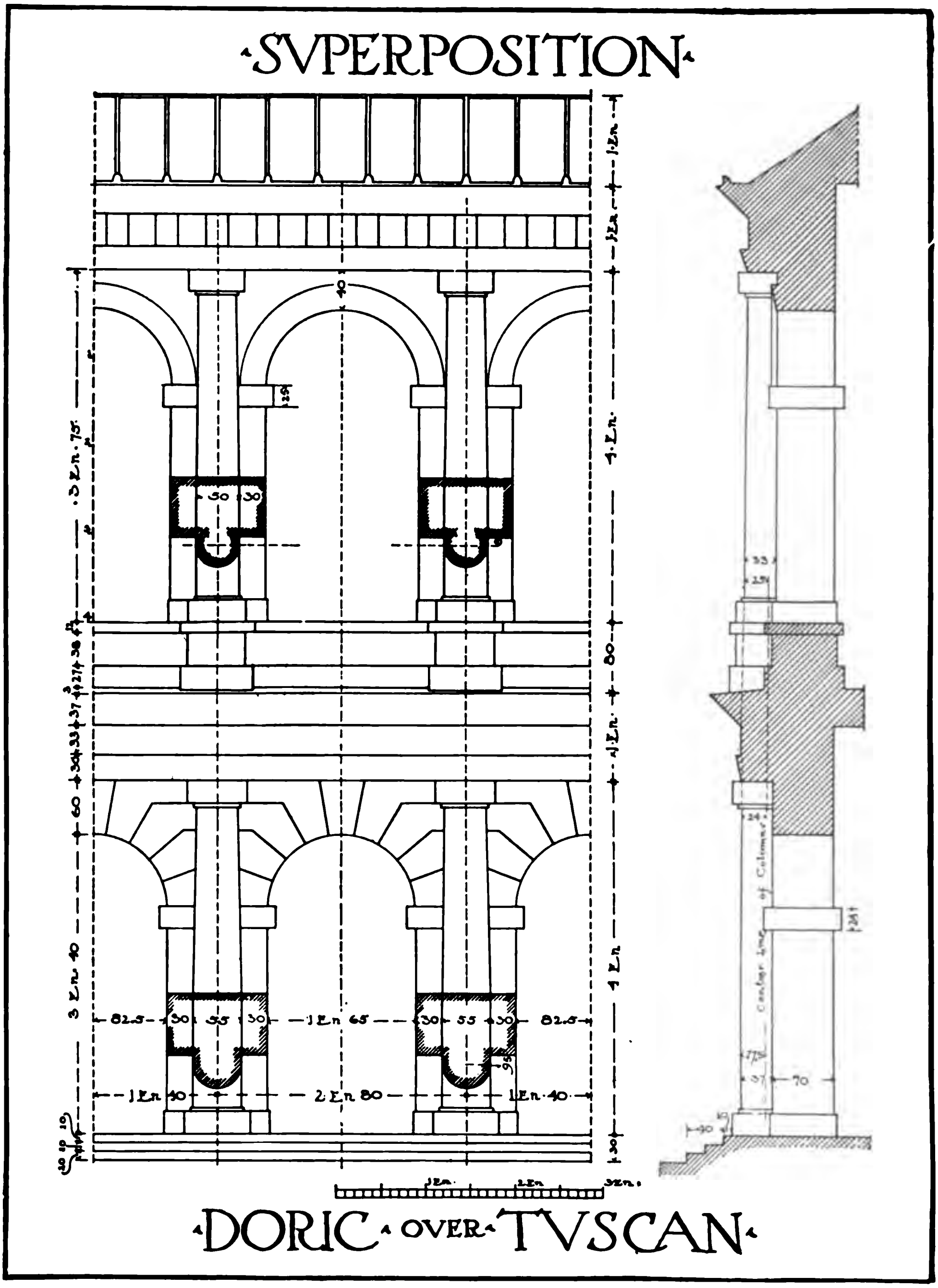

SVPERPOSITION
DORIC OVER TVSCAN
1 En
4 En
80
1 En 65
2 En 80
1 En 40
82.5
30
55
3 En 40
3 En 75
Center Line of Columns

Fig. 22.

by an appreciable amount. Although the figures given show a difference of only five parts, it must be remembered that the unit employed in the upper order is smaller than that used in the lower story, and therefore the difference is somewhat more than that which the actual figures suggest.

126. By referring to the section (Fig. 22) it will be seen that in this example the second-story column shaft at the base, lines with the frieze and column shaft at the neck of the order below, while the second-story pedestal and column base project beyond this line. This arrangement allows the center line of the second-story column to be over the center line of the column below.

127. In Fig. 23 another method is followed; here the face of the pedestal or die of the second-story order is placed in plane with the frieze and column neck below, when it becomes impossible for the center line of the columns to coincide; there being, as shown by the dotted line in the section, a difference of eight parts between these center lines.

128. In Fig. 24 again, we find that the base of the shaft of the second-story order lines with the neck of the shaft below.

129. Where a pedestal is given to a second-story super-imposed order, except under exceptional circumstances, the method shown in Fig. 23 would probably be most certain of making a favorable impression upon the observer, although it might be possible that a compromise between the methods shown in Figs. 23 and 24 would better solve the problem. Such a question must be decided by the judgment of the designer. It might be said, however, that where the second-story column is placed upon the entablature of the first-story order without the interposition of a pedestal, the best effect would invariably be obtained by directly lining—in section—the face of the foot of the second-story column shaft with the face of the neck of the shaft below.

130. The facade shown in Fig. 22 is composed of two rows of super-imposed arches, one of the Tuscan and the other of the Doric Order, each pier carrying on its face an attached column shaft.

The Doric Order is raised on a support forming a pedestal and having a cap and base.

131. Fig. 23 is a facade of two stories, with the Ionic Order placed over the Doric Order. The columns are engaged in the

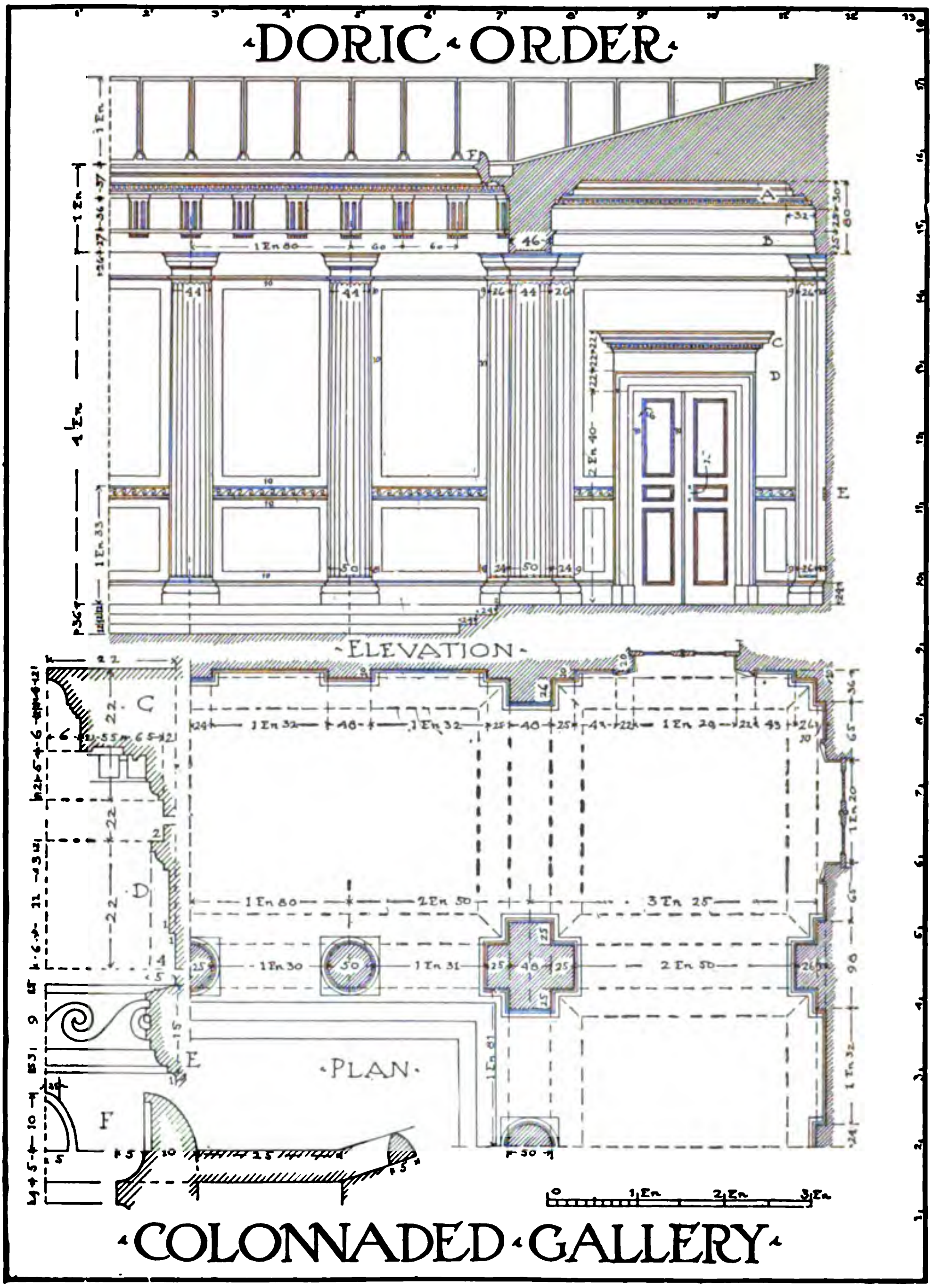


PLATE XXV.

(A reproduction at small size of Portfolio Plate XXV)

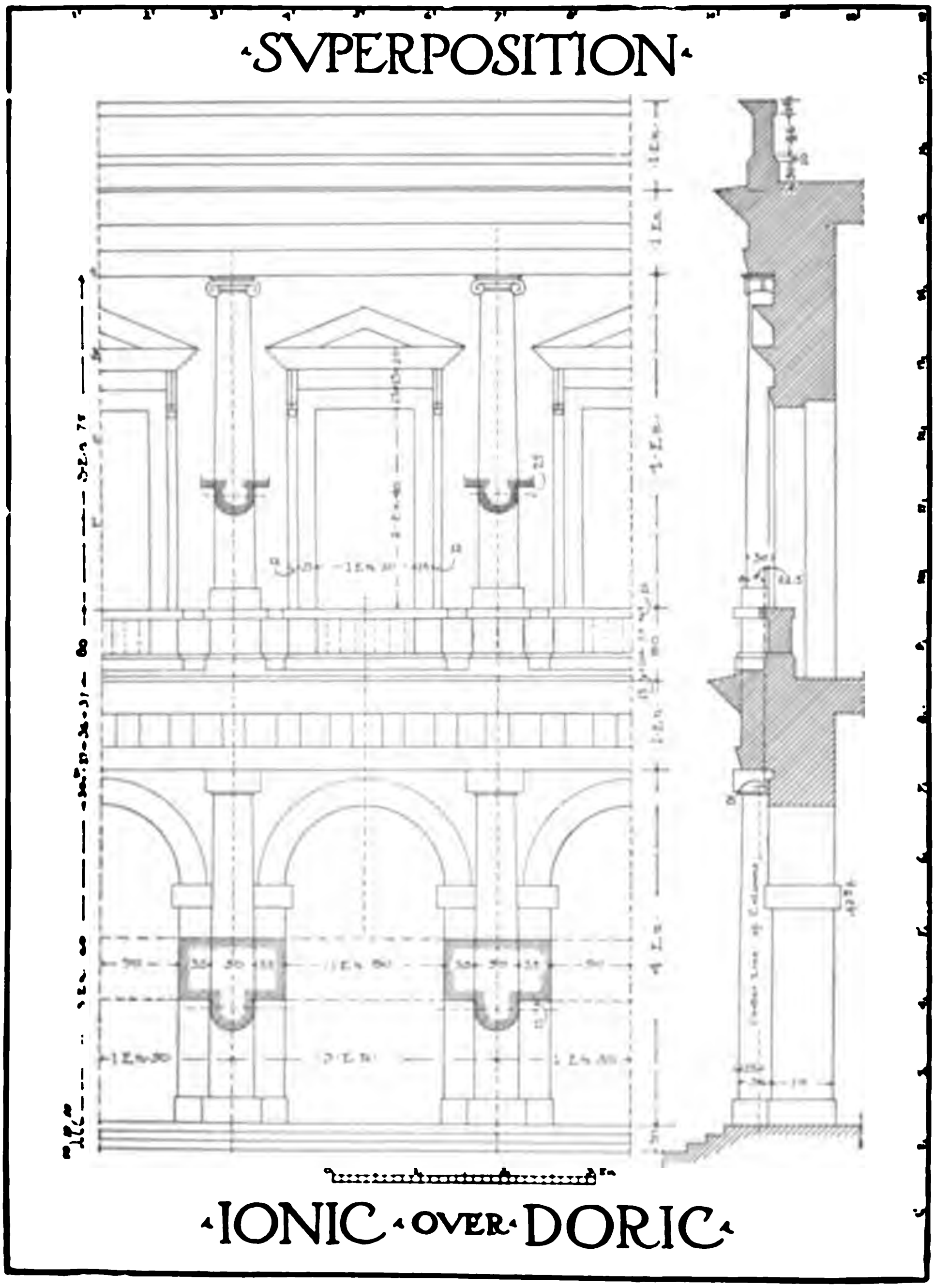
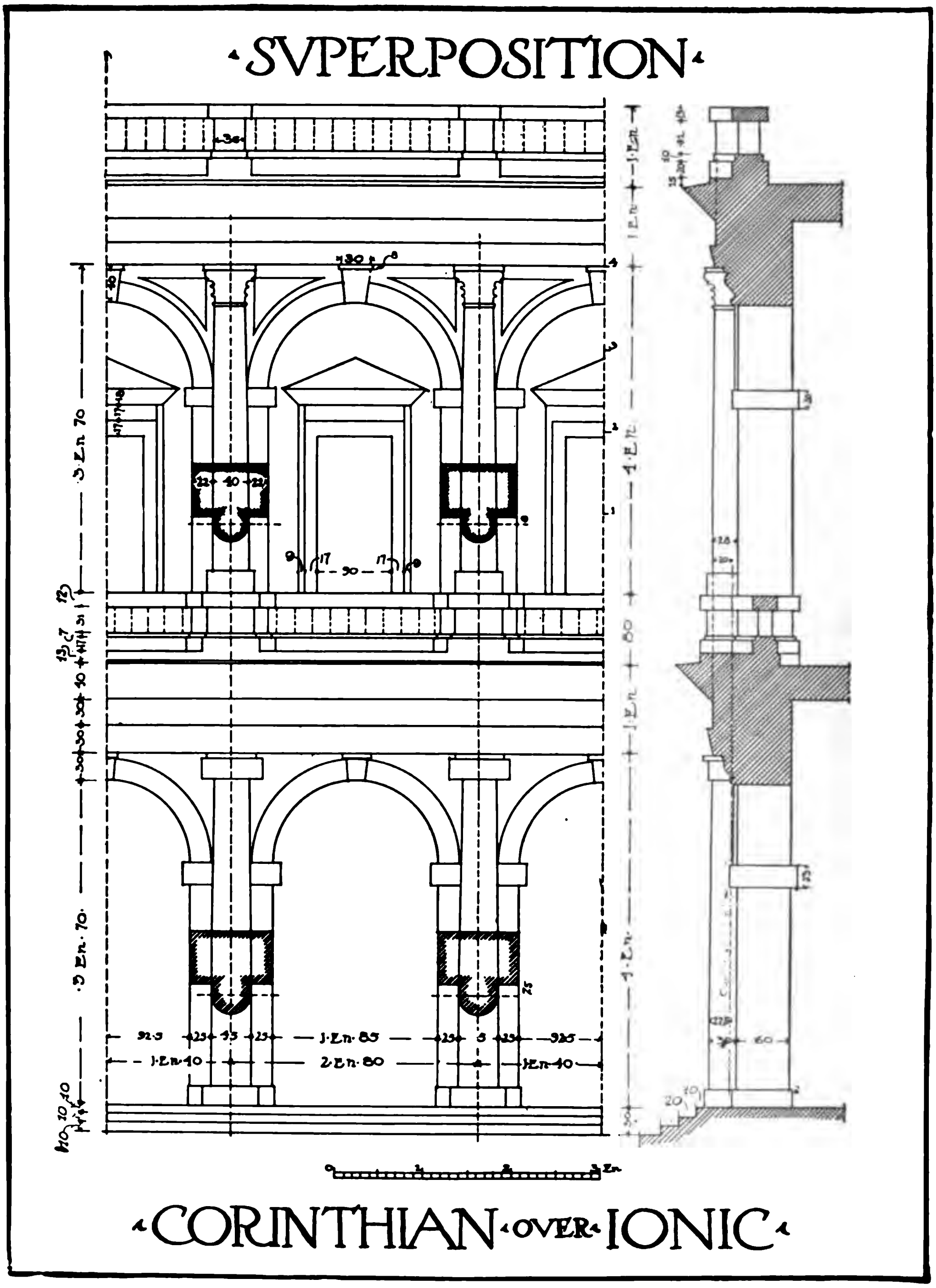


Fig. 23.


SVPERPOSITION
3·En 70
3·En·70·
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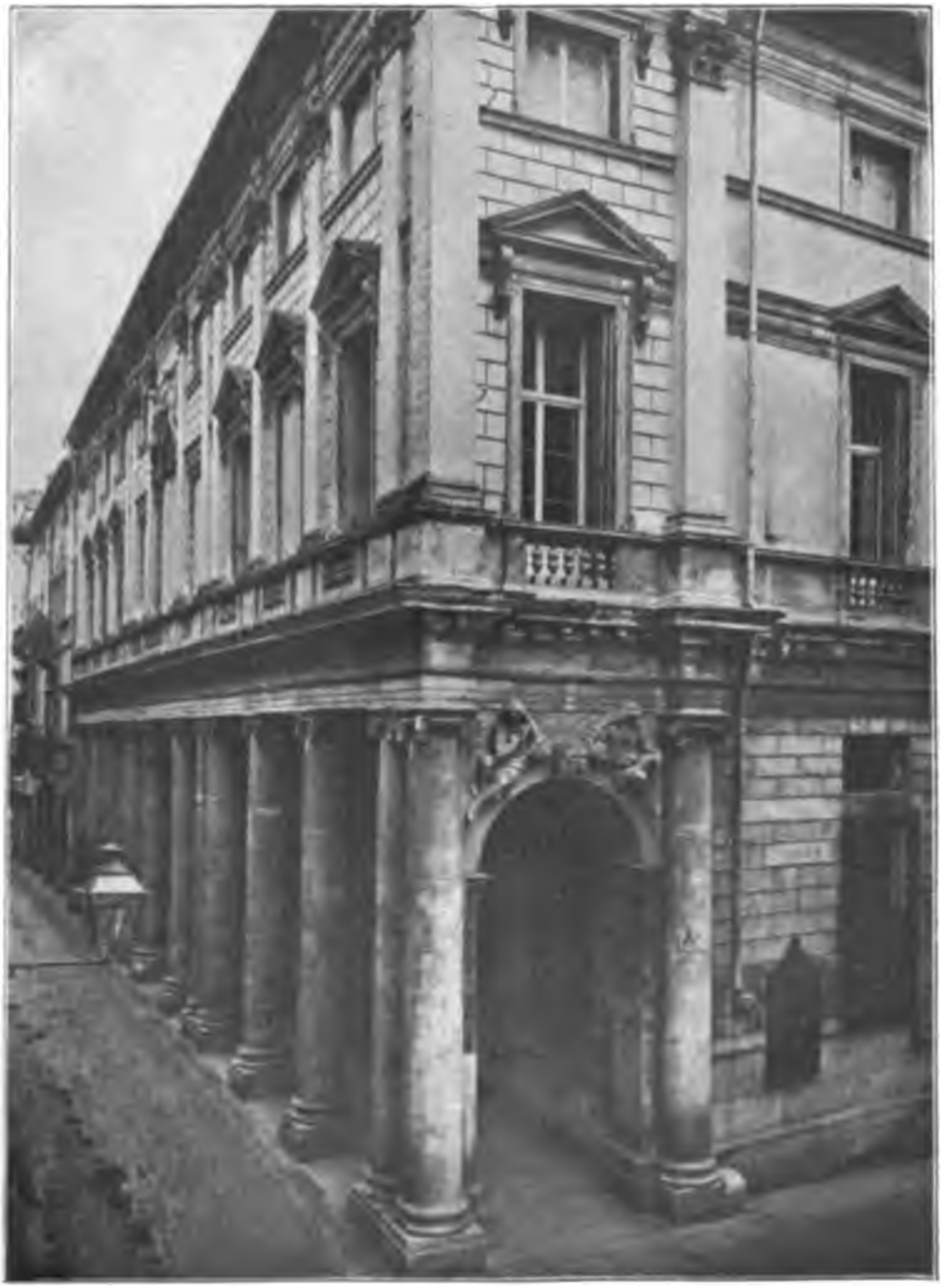
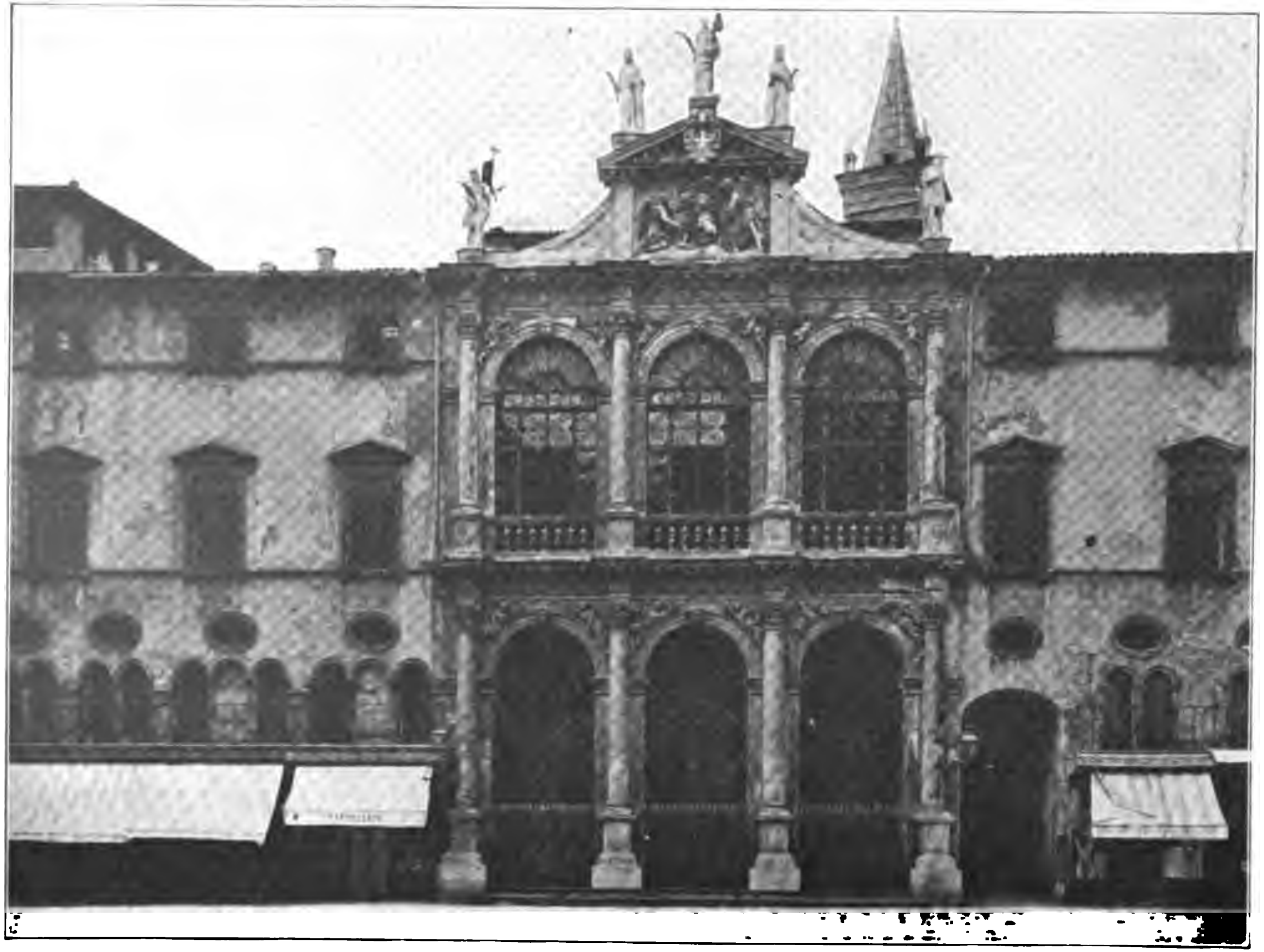
CORINTHIAN OVER IONIC

Fig. 24



Porto Palace, Vicenza, Italy ([illegible]); Vicenzo Scamozzi, Architect
A Renaissance example of the use of Composite pilasters over an Ionic colonnade



Façade of Church of San Vicenzo, Vicenza, Italy (Fifteenth Century).

A Renaissance example of the use of arcades and columns after the Roman manner, the Composite Order being placed over the Corinthian

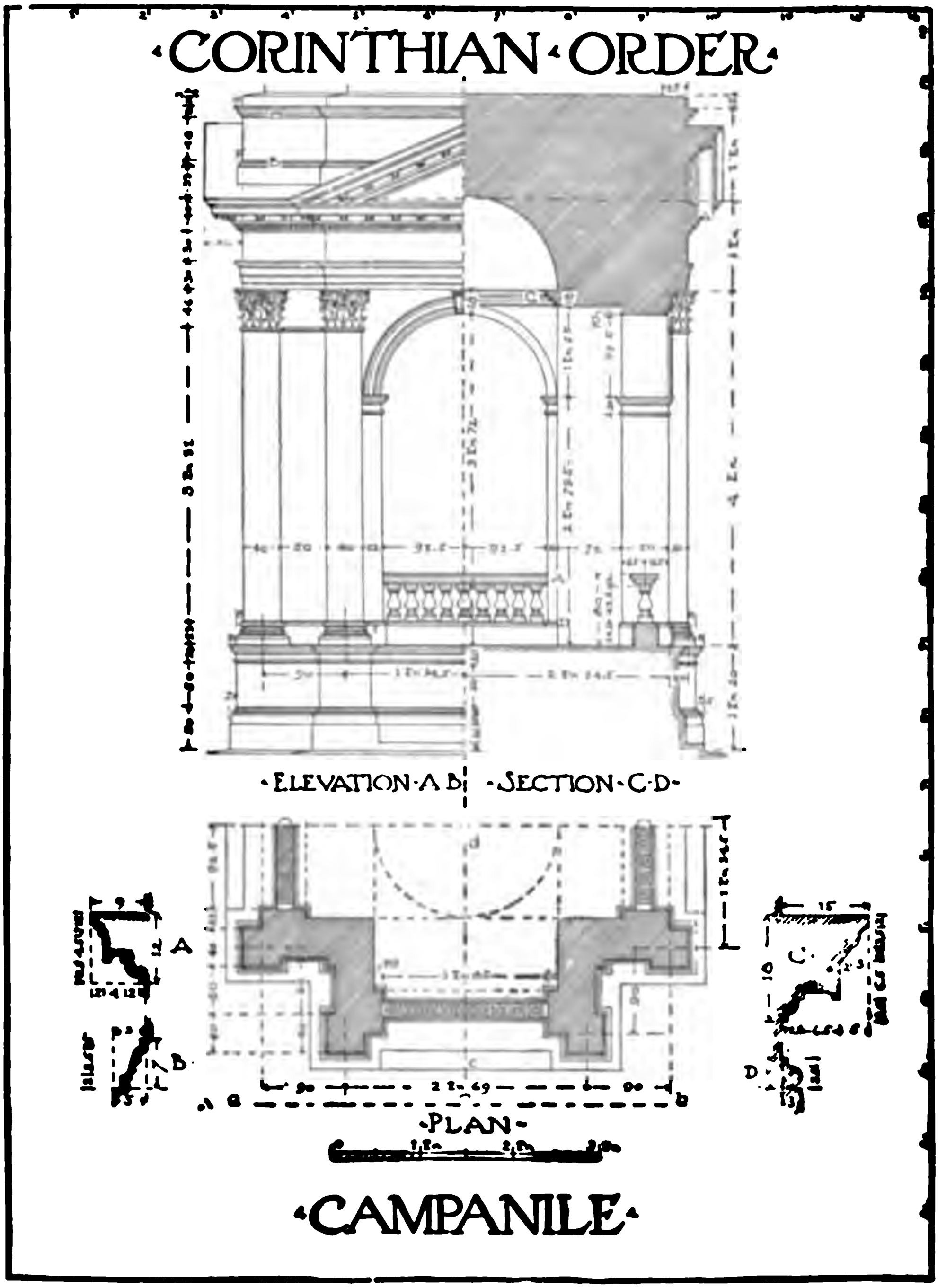


PLATE XXVI.
(A reproduction at small size of Portfolio Plate XXVI.)

wall which is pierced with arches between the lower columns, and with rectangular windows between the upper columns. The windows are ornamented with frames or architraves with an outer pilaster finish carrying consoles, the whole being surmounted by an entablature with a pediment. The details of these parts should be taken from the examples of similar details shown in Plate XXVIII.

The support or pedestal of the Ionic Order forms a balustrade in the bay of the window.

132. In Fig. 24 is shown a section of a facade of two stories where the Ionic Order is used with the Corinthian above it. The columns are placed between arches, forming an arcaded gallery. The windows shown are found in the wall at the back of the gallery, and the upper entablature is surmounted by a parapet wall or balustrade.

EXAMINATION PLATES

133. The student who has followed closely this analysis with its application, will have an intelligent knowledge of the Orders, and may put his knowledge to practical use in the exercises which follow.

IN GENERAL.

In laying out, from the descriptions and plates, the various problems which follow, some differences from the proportions already given may occasionally be found. These differences, in all cases attendant upon some ethical reason or principle of the problem involved, must be understood by the student before he attempts to apply the theoretical knowledge of the orders already acquired. Then, from the general dimensions given to determine the proportions of the problems, he will find it possible to complete the design by the application of the various details shown in the preceding plates. These exercises require the application of what the student has previously learned, to actual– if academic— problems, while they will also serve to illustrate such details as the proportions of arcades and openings, and the spacing of columns and of piers.

134. These exercises must be drawn out in pencil before inking in any parts of the drawing. The plan is the prime essential

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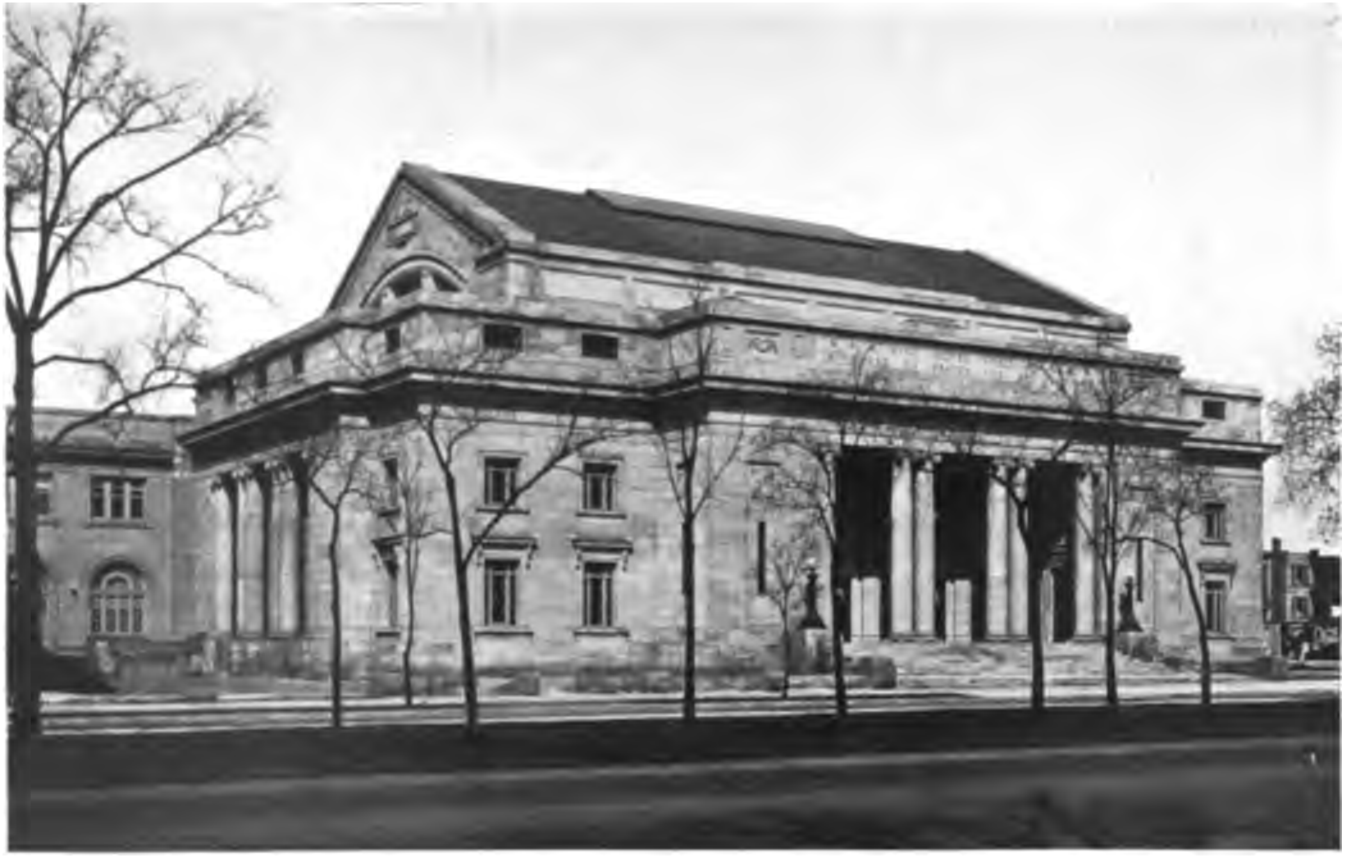


SINAI TEMPLE ON GRAND BOULEVARD, CHICAGO

Alfred S Alschuler, Architect, Chicago

This building is an excellent example of modern church architecture The low portion at the left connects the main temple with the social center, a large building at the south

and should be first determined and drawn out. In starting a drawing, either in plan or elevation, the general principles given in paragraphs 5, 6, 9, 10, and 11 should be observed. The center line or axis must first be established in order to determine the relation and the placing of the drawing upon the paper.

135. The dimension figures given throughout these exercises may be omitted from the drawing; but all the lettering, both large and small, must be included. The plate must be signed and dated in the lower left or right-hand corner, and sent to the School for correction and criticism. The plates must be taken up and drawn out in the order given and the first plates submitted when three are completed in order that the student may profit by the instructor's corrections as he progresses with his work.

The Examination for this Instruction Paper consists of fifteen plates, which should be sent to the School in six instalments:

1st	**Instalment**	**A, B, and C,**	**4th**	**Instalment**	**I, J, and K,**
2nd	**"**	**D and E,**	**5th**	**"**	**L and M,**
3rd	**"**	**F, G, and H,**	**6th**	**"**	**N and O.**

Each Instalment should be sent as soon as completed.

The paper for these plates should be purchased in sheets 22 inches × 30 inches. (Imperial size). Some of the plates are to be 11 × 15 inches (¼ of Imperial size) with border line ½ inch inside, making panel 10 inches × 14 inches. Others are to be 13 × 18 inside of border line, for which use ½ an Imperial sheet; while a few will require the whole sheet and should be 20 inches × 28 inches inside of border lines.

PLATES A AND B.

136. These exercises are shown in Fig. 4 and Plate II respectively. Fig. 4 should be drawn to the size shown in the margin, each unit representing one inch. Therefore the finished plates will be 10″ × 14″ in size. Plate B should be an accurate copy of Plate II. Leave out dimensions.

PLATE C.

137. The sheet of mouldings shown in Fig. 5, is to be redrawn on a plate whose border line is 10″×14″. The names of the mouldings with the general title of the plate should be lettered in, following as closely as possible the model illustration.

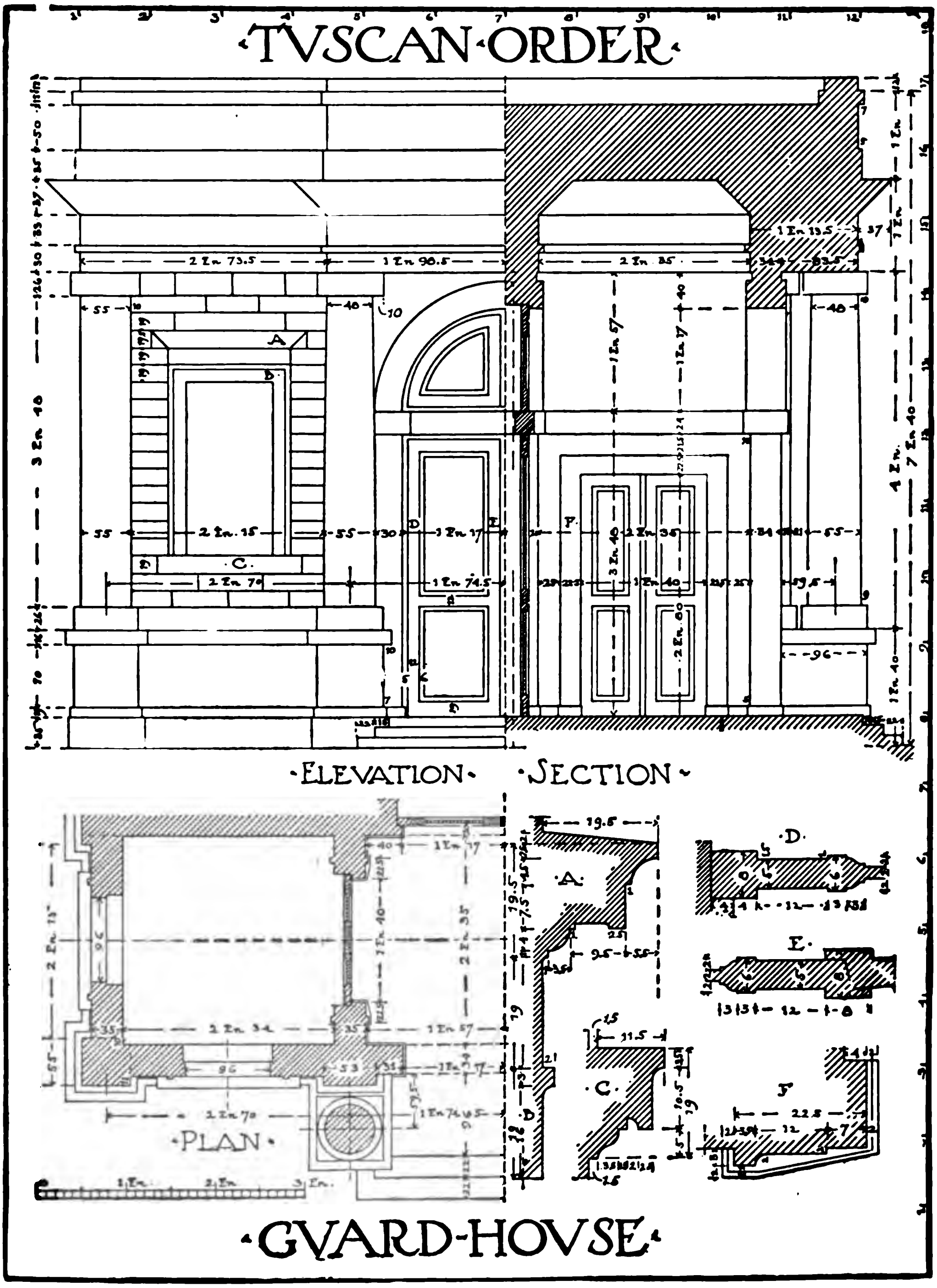


PLATE XXVII.
(A reproduction at small size of Portfolio Plate XXVII.)

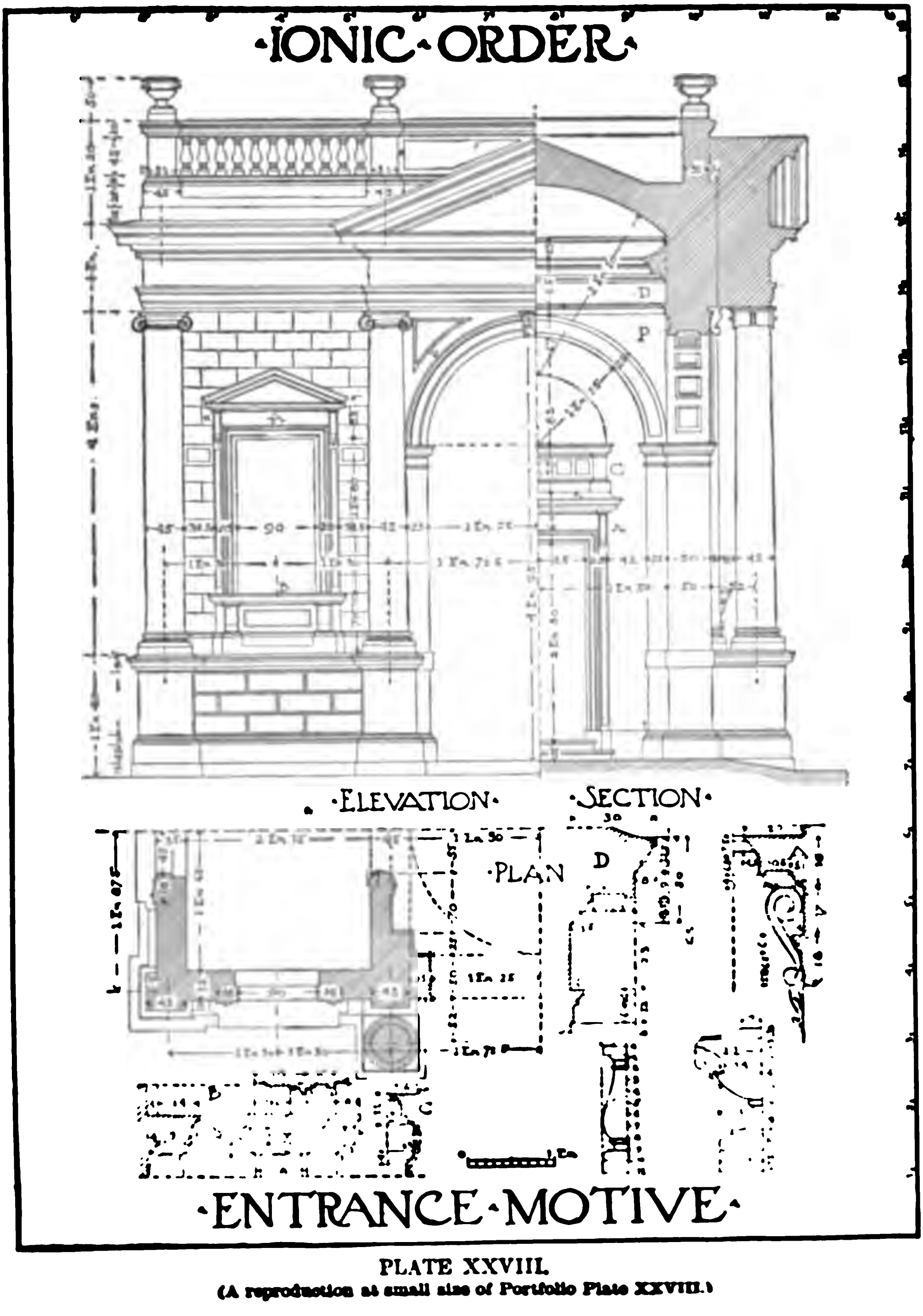


PLATE XXVIII.

(A reproduction at small size of Portfolio Plate XXVIII.)

PLATE D.

138. Draw a plate to the border-line size of 10″×14″ and arrange after the manner shown in Plate VIII, assembling the various details of the Doric Order shown in Plates III, IV, V and VI, and following the measurements for the separate parts therein given. The placing of these details on the plate, with their relative size, lettering, etc., is to be as shown in the model, Plate VIII. Either the Mutular or the Denticular Order may be drawn out, as the student may prefer.

PLATE E.

139. The Ionic Order is to be drawn and the finished plate is to correspond in appearance and arrangement with the model, Plate XIII, and is to follow the construction and proportions given in plates X, XI and XII.

PLATE F.

140. The Corinthian Order is to be drawn so as to resemble the model, Plate XXI, and is to follow the measurements, proportions, etc., of Plates XVII, XVIII and XIX. Plates XV and XVI should assist materially in understanding the method of drawing the Corinthian capital shown in Plate XVII.

PLATE G.

141. The arched doorway of the Denticular Doric Order, shown blocked out in rough outline in Fig. 25, is to be drawn to follow the general dimensions, and to include all the details given in the plates of that order. The border line should be 20×28 inches in size.

The width of the archway is two and one-half entablatures, and the columns, from center to center, are three entablatures and sixty parts apart. The heights, and the placing of the plan and elevation on the plate, will all be easily ascertained by following the inch units shown against the border line, Fig. 25.

PLATE H.

142. The archway of the Ionic Order shown in Plate XXII is to be redrawn with the same outline size as in Plate G. The width of the Ionic arch is two entablatures, fifty-five parts, and

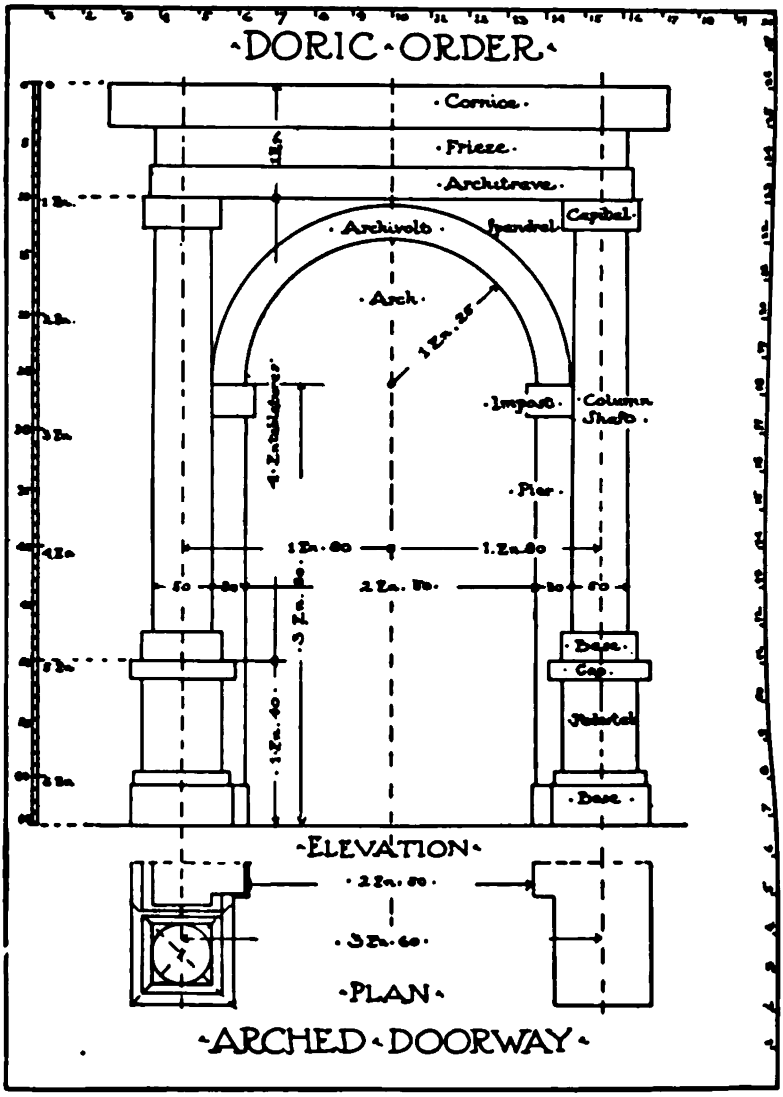


Fig. 25.

its height is equal to twice its width, an accepted general rule for proportioning arches. The archway is ornamented with two columns placed before pilasters, which are in turn set against the face of the piers.

Apply to this exercise all the details of the preceding studies in the Ionic Order and draw out, as shown in this plate, the plan, the half elevation, and the section.

PLATE I.

143. As an application of the study of the Corinthian Order, draw out an archway similar to that of the Ionic Order just described. The drawing should show a plan, section, and half elevation, but should follow the proportions and dimensions given in the plates of the Corinthian Order. The columns are spaced about 3 entablatures and 40 parts and the center of the archivolt is occupied by a keystone ornamented with the console shown in Fig. 16.

This problem is exactly like the problem of the arched doorway in the Ionic order except for the fact that the proportions and details are those of the Corinthian Order. The distance 3 En.-40 from center to center of the columns is the only dimension given for this plate. The student is expected to obtain all the other necessary dimensions from his study of the preceding plates.

144. In drawing this problem, which will be on a smaller scale than the Corinthian Order plates drawn before, the student should pay particular attention to the proportions of the parts. Some little difficulty may be experienced in laying out the smaller members. While at such a scale it may seem impracticable to draw these members in their true relative size, still, the general proportions of the details of the order may be clearly indicated, if carefully studied and drawn. The sheet should be 20″×28″. This size is given so that the student will experience as little difficulty as possible with the smaller members and still have the drawing of a convenient size. Begin by drawing a vertical center line and on each side of this lay out the center lines of the columns.

PLATE J.

145. This exercise requires that the student use the Tuscan Order shown in Fig. 6, and the details shown in Plate II. This order is required because it will be found easier to use in these early problems on account of the large scale of the mouldings and the few lines required in their delineation. It is to be drawn out to the size of 13"×18" and is to follow in appearance and arrangement, Plate XXIII. On this plate the plan is completely shown, while the elevation is merely blocked out in the rough, in order that the student in completing it may have independent practice in the use of the order.

This problem displays the inner corner of a square or rectangular court yard, which is surrounded by an arcade composed of the Tuscan pilaster and archway. The floor of the gallery is raised three steps of fifteen parts each, above the level of the court.

146. The gallery is vaulted with semi-circular vaults; that is, vaults whose form is a semi-circumference. A vault formed of a semi-circular arch, without penetrations throughout its whole length, is called a barrel vault. Two vaults of the same radius which intersect each other form what is called a groined vault, because of the hips or groins which mark their intersection. The vaults over this gallery are barrel vaults, which, by their intersections at the angles as well as by the penetrations of the barrel vaults which correspond to the arches of the gallery, form groined vaults. The dotted diagonal lines on the plan show the groins of the vaults. The width of the gallery is two entablatures and forty parts, this width being equal to the distance between the pilasters of the facade. The groined vaults are separated by a space of fifty-five parts, that is, a distance equal to the width of the pilaster.

PLATE K.

147. This exercise is to be drawn out at the same size as the one just given, 13"×18", and the plate numbered XXIV is to be accurately copied. The subject of this exercise is a gallery in the Doric Order with arches, surrounding a court or garden. The arches rest upon piers, decorated on their faces with a couple of pilasters spaced under alternate triglyphs. The space between the pilasters, occupied by the arches of the arcade, is determined by the spacing of the triglyphs, four of which occur over the arches. These pilasters are repeated in the interior of the gallery, which is covered by a flat ceiling, supported by an entablature whose details are shown on the lower portion of the plate. The ceiling over the corner is separated from that of the rest of the gallery by entablatures and arches resting on pilasters advancing

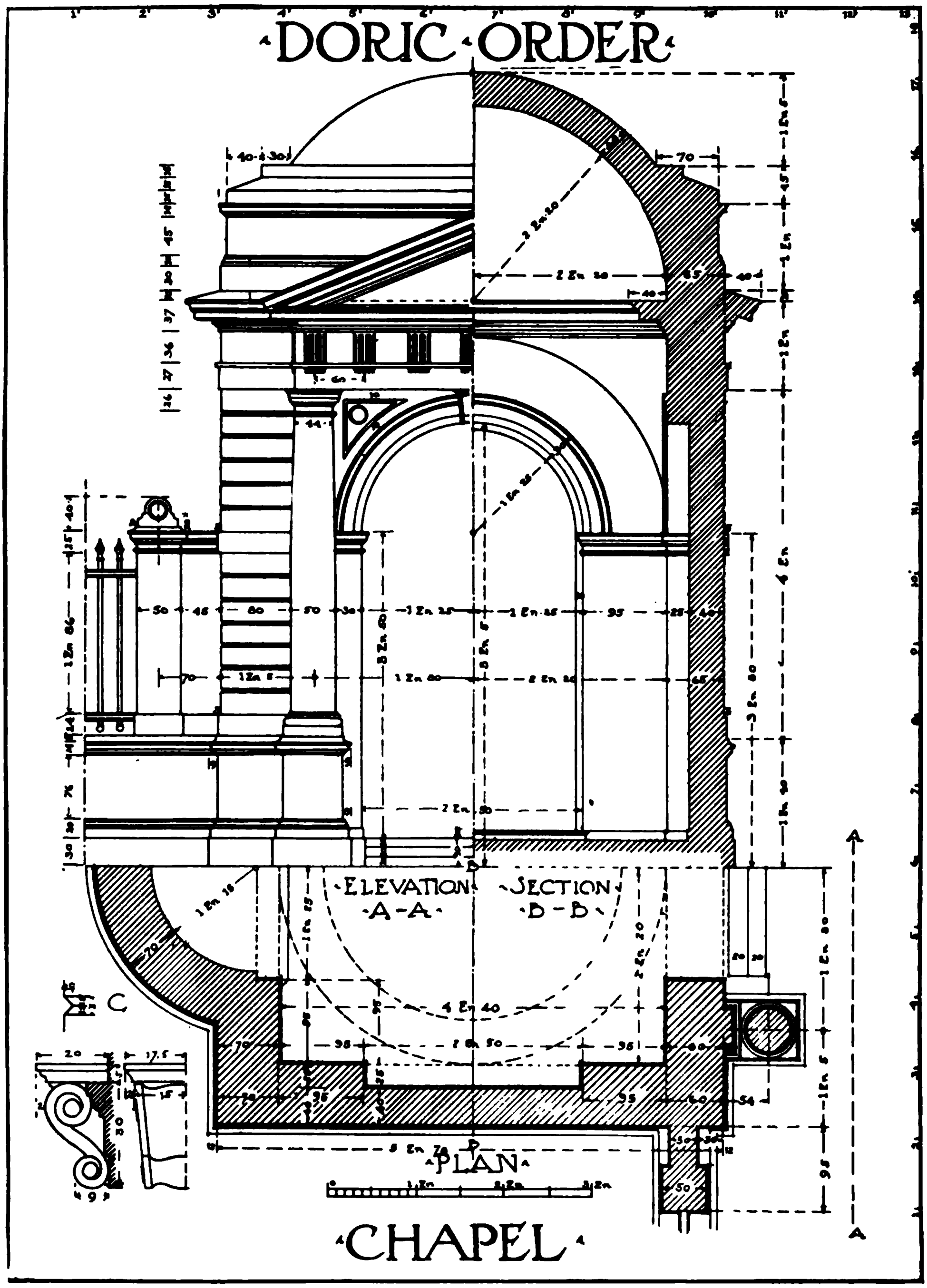


PLATE XXIX.

(A reproduction at small size of Portfolio Plate XXIX.)

from the faces of the corner piers. This combination is shown in dotted lines on the plan. The gallery arches are repeated on the blank wall which encloses the gallery. The exterior entablature is surmounted by a plain parapet or balustrade, as the roof of the gallery is flat and would be accessible from the second story of the edifice.

PLATE L.

148. This exercise is fully drawn out in Plate XXV, and should be copied by the student at the same size as the ones just preceding. In this example we have shown a gallery with colonnade; no arches being employed in the problem.

Here we have another possible treatment for a gallery surrounding a court or garden. It is that of a portico or colonnade, with a flat ceiling, the angles being strengthened by square piers, against each face of which a half pilaster is placed. This causes two pilasters to occur in line with the columns, and the other two to face toward the interior of the gallery, with two other half pilasters projecting from the surrounding walls, opposite them. The architrave of the connecting entablature forms a soffit between them, as the dotted lines of the plan indicate.

149. The surrounding walls are pierced by doors on the longitudinal axes of the gallery. These doors are surrounded by moulded architraves and crowned by entablatures or door caps. A wainscot, or dado, is formed by a string course ornamented with a Vitruvian scroll or wave (this is the term applied to the ornament whose detail is given on this plate at E). A plinth, or base, corresponding in height to the base of the column, runs around the walls; its crowning moulding being formed of the fillet and bead of the column base. The astragal of the capitals also continues around the walls, which, in addition, are decorated with panels intended to receive mural paintings. The flat ceiling, or soffit, of this gallery is similar to that of the preceding exercise and is supported or surrounded by the same entablature. The sloping roof is formed of sheets of zinc or lead corresponding in width to the spacing of the triglyphs, and with lips or rolls formed by the interlocking edges of the sheets. On the same axis with each lip is an antefix placed above the cornice, and shown in detail at F on this plate. In the cornice is formed a gutter for the removal of rainwater.

PLATE M.

150. The student is required to design an arcade and gallery using the Ionic Order. This gallery is to be similar in treatment to the one shown in Plate XXIII, where the Tuscan Order is employed. The plan of this gallery is shown in Fig. 26, while a perspective sketch of the spring of the arches on an interior angle is shown in Fig. 27. On the plan is indicated in dotted lines the form of the arching ceiling over this gallery. It is simply described as a barrel vault with the penetration from each side of arches of a less height and radius. The perspective sketch shows the method of treating the impost moulding on the interior, breaking it around the various pilasters forming the corner pier. On the exterior, the entablature is crowned by a balustrade composed of balusters similar to those shown in Plate XXXIV. The plan will give the width of the arched openings which, as we have already seen in other examples of the Ionic Order, are in height twice their width. This will determine all the remaining proportions of the exercise, which is to be drawn of the same dimensions as the preceding plates, 13×18 inches.

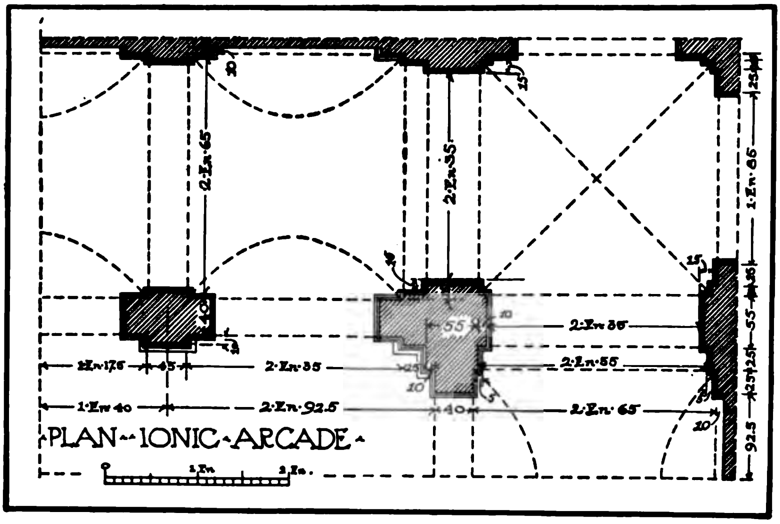


Fig. 26.

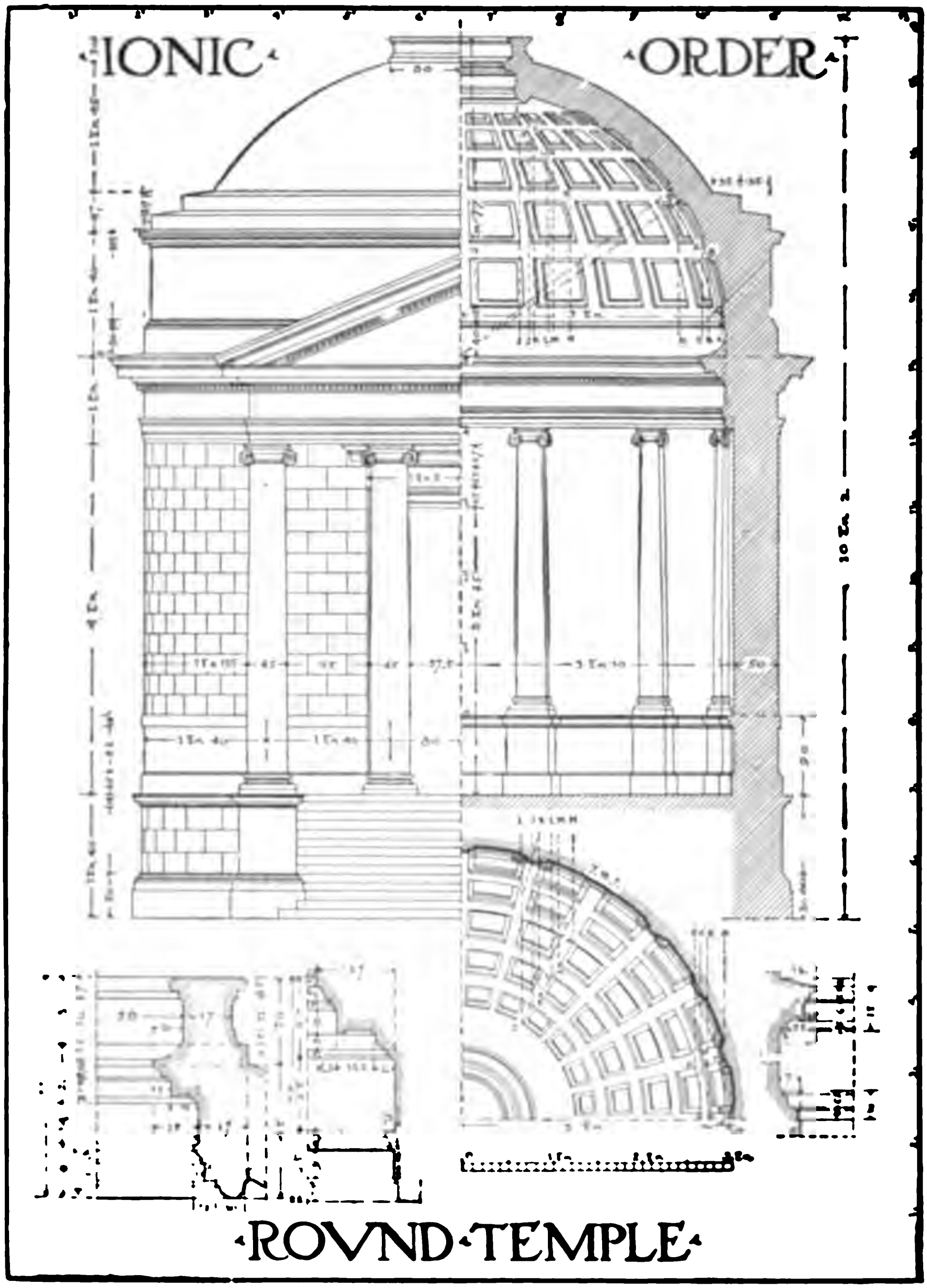
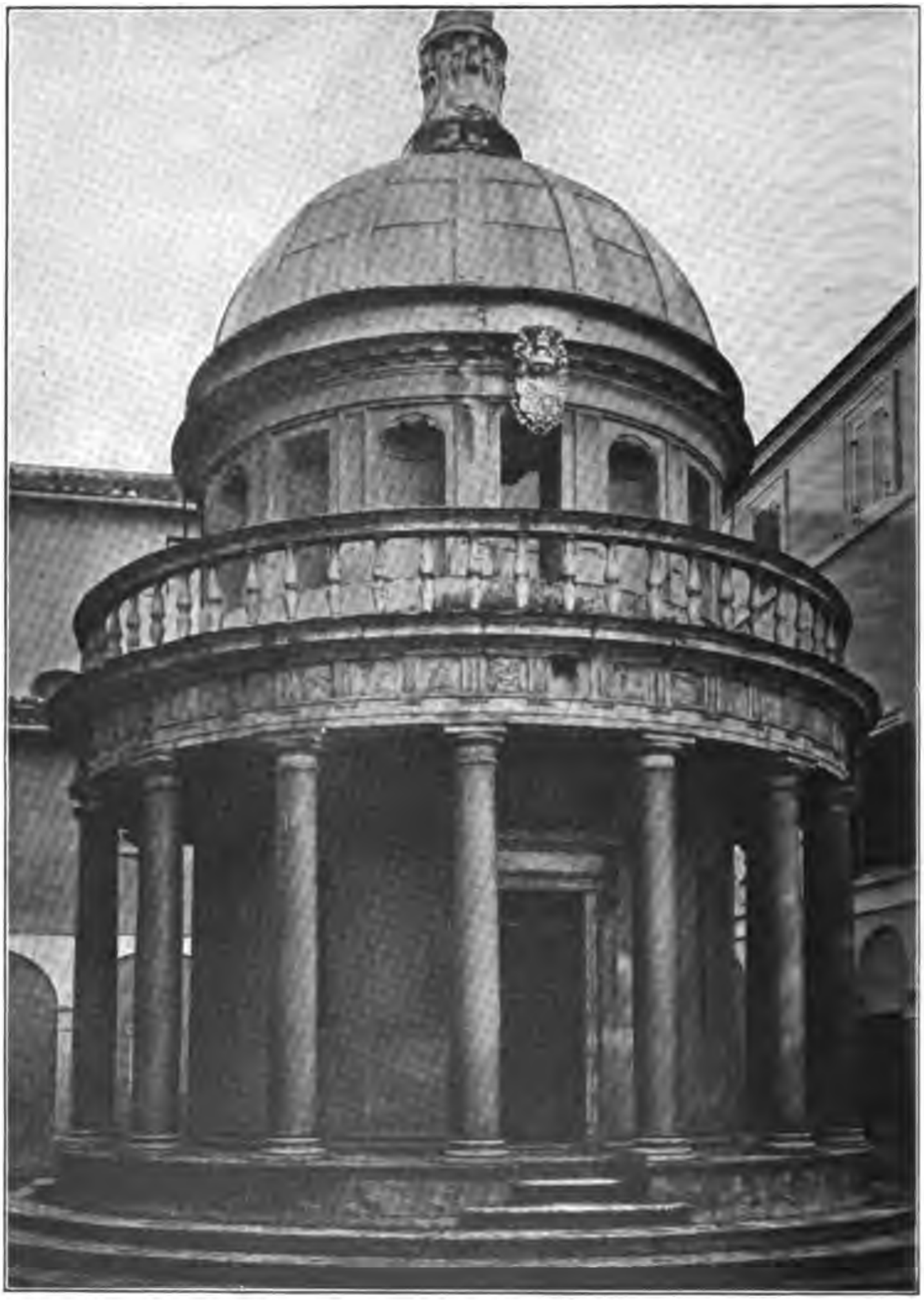


PLATE XXX
(A reproduction at small size of Portfolio Plate XXX.)



Circular Temple in Courtyard of San Pietro, Montorio, Rome; Donato d'Angnolo Bramante, Architect
Showing Renaissance use of Doric Order in a circular temple with domed lantern above.

PLATE N.

151. In Plate XXVI the Corinthian Order is used for ornamenting the final or crowning story of a Campanile or classic belfry. This problem is simply that of the arch placed between columns, which we have already seen in Plate I; the entablature being crowned with a pediment and such other modifications being made as the problem suggests. The student is required to draw out this plate at the same size as those preceding, 13′×18′, or if he desires he may substitute the Ionic Order and adapt its proportions and details to the same plan.

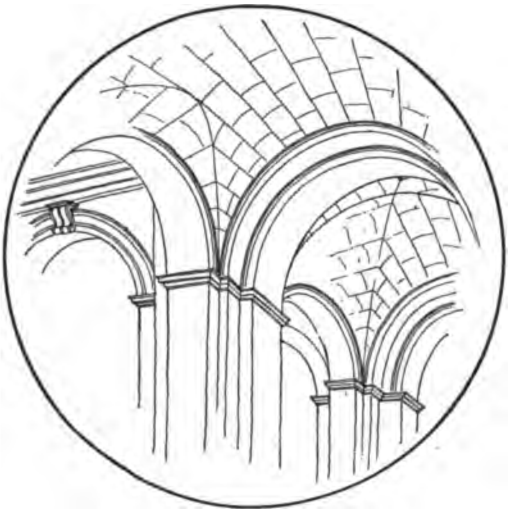


Fig. 27.

This upper portion of a Campanile may belong to a church, a city hall, or any other important edifice. The four facades are the same; each is composed of an arch flanked by two pilasters, carrying an entablature, a pediment, and a parapet. Each facade makes a projection from the mass of the tower. The four pediments penetrate the plain parapet which will, in turn, be surmounted by a roof or cupola. The interior is covered by a dome with pendentives (see paragraphs 157-158).

PLATE O.

152. Plate O is shown in Plate XXVII. This exercise requires merely the application of the arch and column of an arched doorway of the Tuscan Order to an actual problem; in this instance, arbitrarally termed a "guard house," the student is required to arrange his drawing on a sheet of the same size as in the previous example, and as shown in this plate. The plan and details being given, he must draw out the elevation.

153. The central part of the plan in this exercise is a porch, with arches, giving access by three doors to rooms placed on each side of the entrance, and to a hall or larger room at the rear.

154. We have called this problem a guard-house, because the disposition of the plan and the architectural character of the facade are well adapted to a problem of this character. The edifice may be completed by adding to its depth two pilasters or bays on each side, two entablatures and seventy parts (2 En. 70) apart from axis to axis; and in this way the lateral facade would be composed of three bays between pilasters, with an opening in each bay; the part added to the plan forms a large hall to which the door placed at the back of the porch gives access. This hall would then be lighted laterally by two windows on each side. The principal facade has a projection formed by two columns placed on pedestals and backed by two pilasters.

All the unanalyzed or new details of the Tuscan Order used in this exercise are shown at a larger scale on this plate. The interior entablature of this problem is the same as the exterior.

This concludes the required Examination; the remaining plates are given as a guide for students desiring to do further work by themselves.

PLATE P.

155. The entrance pavilion in the Ionic Order, shown in Plate XXVIII, is a problem similar to the one that has just been taken up. The student is required to reproduce this plate at the large size to which he has already drawn Plate O, with border line of 13×18 inches.

The small edifice is such as might be used at the entrance to certain public buildings, its plan—the same as that of the guard house—being composed of a porch with a room upon either side. One of these rooms might be the lodge for a porter, the other might be a ticket office. One quarter of the plan only is given as the arrangement is the same on the other sides of the axes.

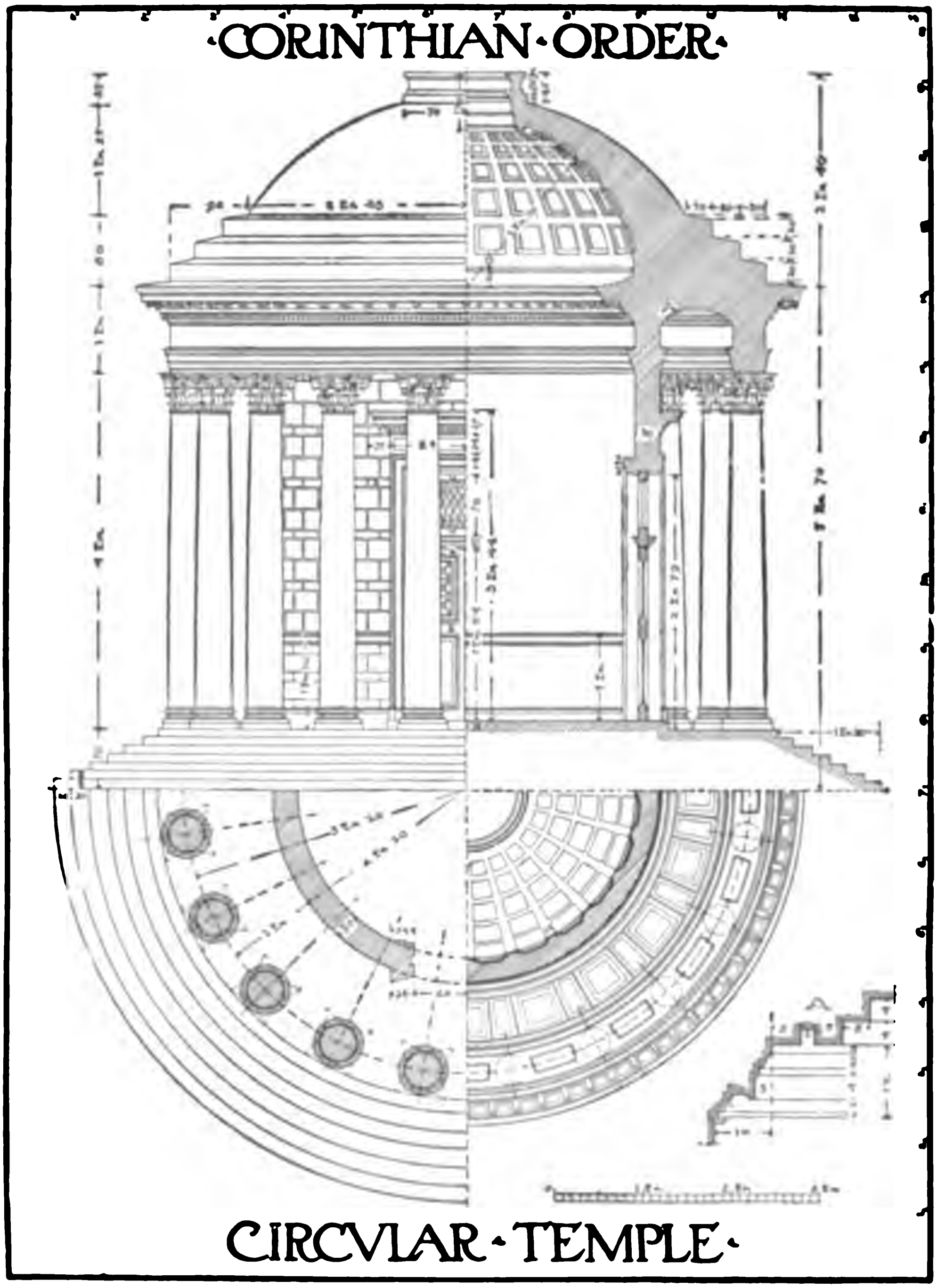


PLATE XXXI.

(A reproduction at small size of Portfolio Plate XXXI.)

156. The front is composed of three divisions separated by columns or pilasters. In the center is the archway of the porch and at each side is a window whose sill is supported by consoles, and surmounting the outside frame are consoles of a different character which support the cornice and pediment. These details are shown in A, B and C on this plate. The same details may be applied to the door of the porch.

The windows at the side are similar to those on the principal elevation. The entablature is surmounted by a balustrade divided by pedestals carrying vases; the details of these balusters and of the vases are shown on this plate.

157. The porch is square in plan but has a ceiling or "cupola" in the form of a dome or spherical vault; that is, the ceiling has the shape of a segment of a sphere, whose radius is 2-En and 20 parts, as shown in the sectional elevation in Plate XXVIII. This kind of ceiling requires explanation. The ceiling must be supported on the walls of the porch, which is square in plan, but the domical ceiling is circular in plan; therefore a horizontal section of the porch at the point where the walls end and the ceiling begins will show a square for the section of the walls and a circle for the section of the ceiling. These two geometrical figures must be joined in some way so that the walls will support the ceiling and the ceiling cover all the space enclosed by the walls.

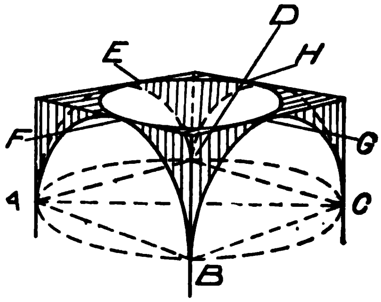
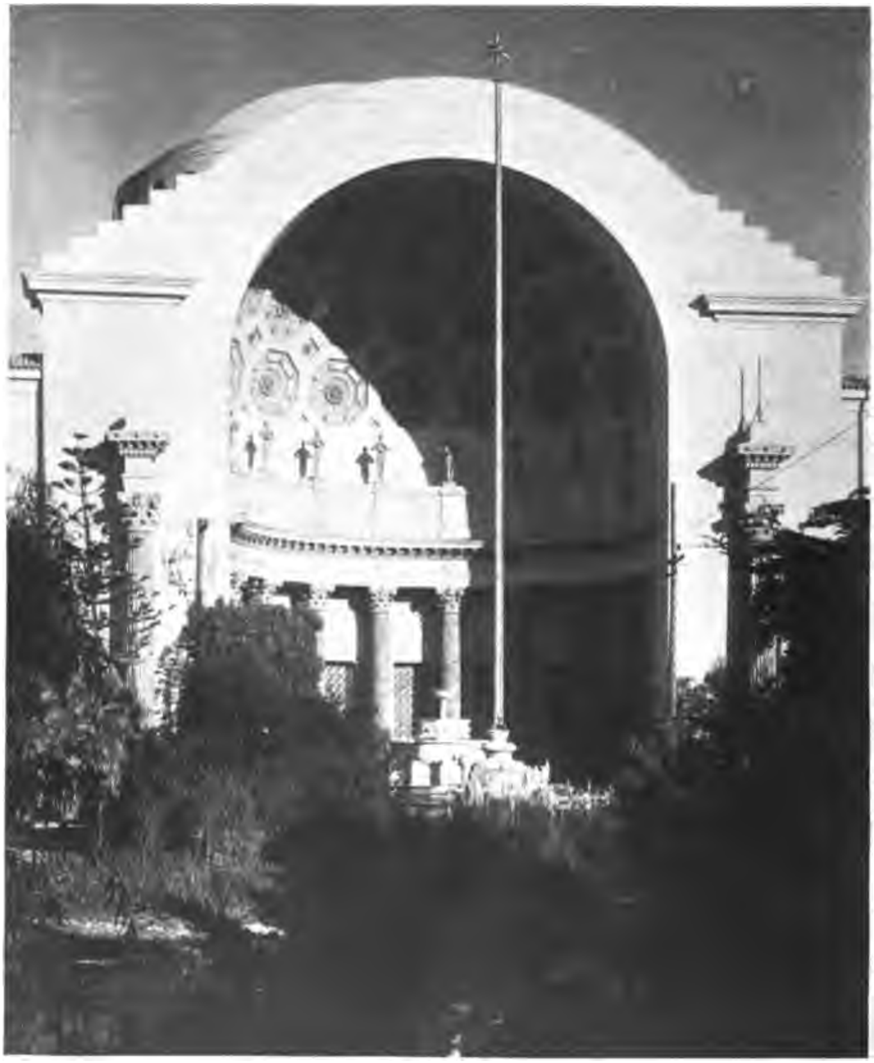
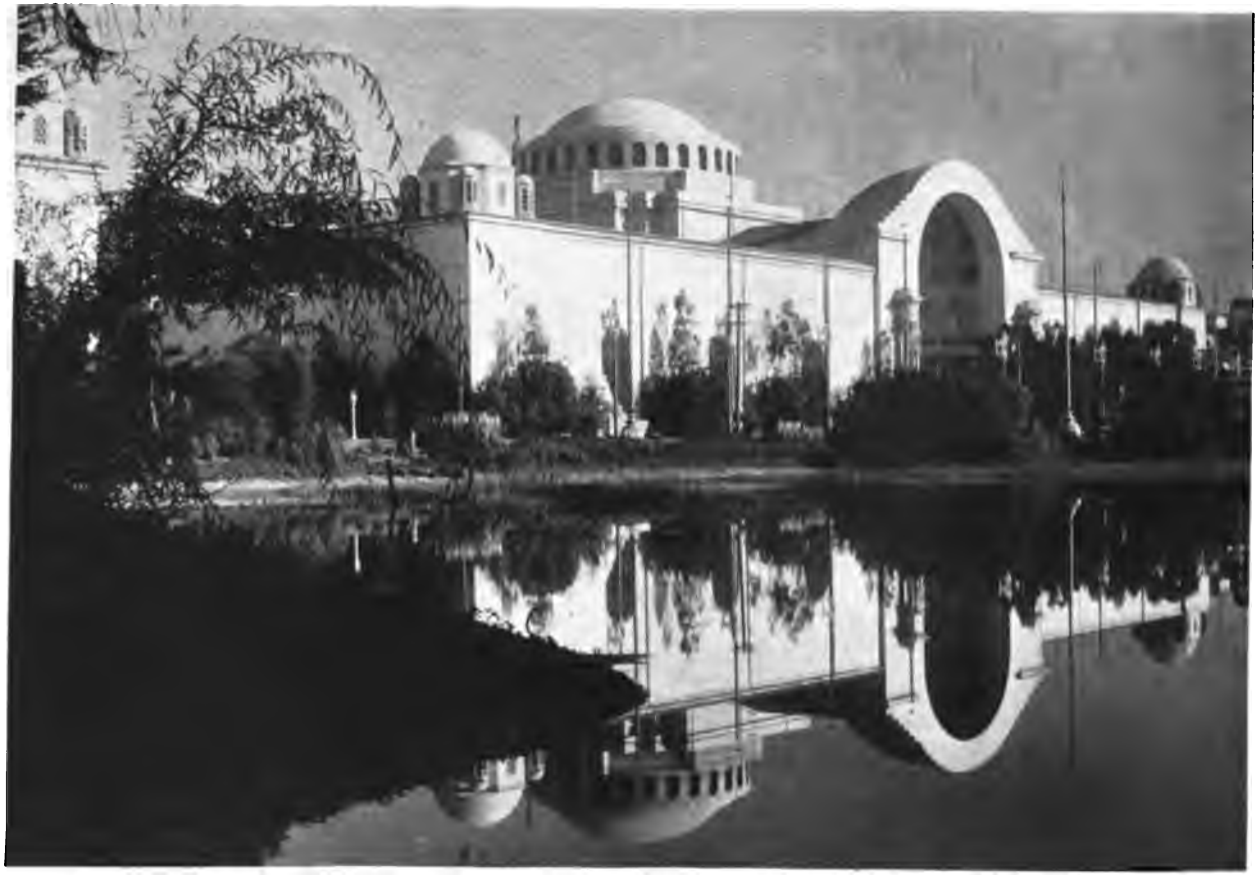


Fig. 28.

Whenever a square space is to be covered by a dome, the semi-diagonal of the square may be taken as the radius for the circle which forms the base or springing line of the dome. Fig. 28 shows at A B C D such a square and circle. If the four walls which form the sides of the square building are now continued upward, they will cut into the spherical segment whose base is represented by the circle, since this circle overhangs the square on all four sides. The figures cut from the domical surface by the walls will be segments of circles,—the intersection of a plane with a segment of a sphere. These segments of circles are shown in plate XXVIII



DETAILS OF HALF DOME—PORTAL OF VIGOR--EDUCATIONAL BUILDING AT PANAMA-PACIFIC INTERNATIONAL EXPOSITION
Bliss and Faville, Architects, San Francisco, California



ONE OF THE FACADES OF THE EDUCATIONAL BUILDING SHOWING PORTAL OF THOUGHT AT THE RIGHT CENTER, PANAMA-PACIFIC INTERNATIONAL EXPOSITION
Bliss and Faville, Architects, San Francisco, California

as the semi-circular arches of radius 1-En and 50 parts, which cover the doorways. A horizontal section taken through the dome at the elevation of the crowns of these circular segments will show a circle which (in plan) will be inscribed in the square formed by the four walls, as shown by the smaller circle E F G H in Fig. 27. This circle is also shown dotted in the plan in Plate XXVIII.

The spherical surface which forms the ceiling of the porch has now been cut into, *first* by the four walls as they are continued upward from the springing line (A B C D) of the dome, and *second*, by a horizontal plane (E F G H) passing through the crowns of the four arches cut from the sphere by the walls. All that is left of the spherical surface is a triangular segment E D H in each corner. This portion of the ceiling is called the pendentive. In Plate XXVIII an elevation of the pendentive is shown at P.

158. The horizontal plane at the crowns of the arches cuts out from the spherical surface a circle (E F G H), which may now be covered over by a dome, or segment of a sphere, which may spring directly from it. In Plate XXVIII this circle is represented in elevation by the first horizontal line of mouldings above the arches. In this particular case, the domical ceiling or cupola does not spring directly from this circle but a small cylindrical band, or entablature, is built up above it for a height of 90 parts, from the top of which the ceiling springs.

PLATE Q.

159. The subject of this exercise (Plate XXIX) is a commemorative chapel of the Denticular Doric Order, and is to be drawn at the size indicated—13″×18″. This is the first of three exercises where a dome plays an important part in the exterior effect of an edifice. In any study, in elevation, of a building employing a dome or cylindrical story, it must be remembered that, in perspective, that portion which is circular in plan looks considerably smaller with reference to the square base from which it springs, than it does in any elevation,—on account of the difference in plan between a square, and a circle which is contained within such a square;—in other words, the circle remains of the same diameter if seen from any point; while an object square in plan, seen from any other position than in direct elevation, has its width considerably increased by the projecting corners.

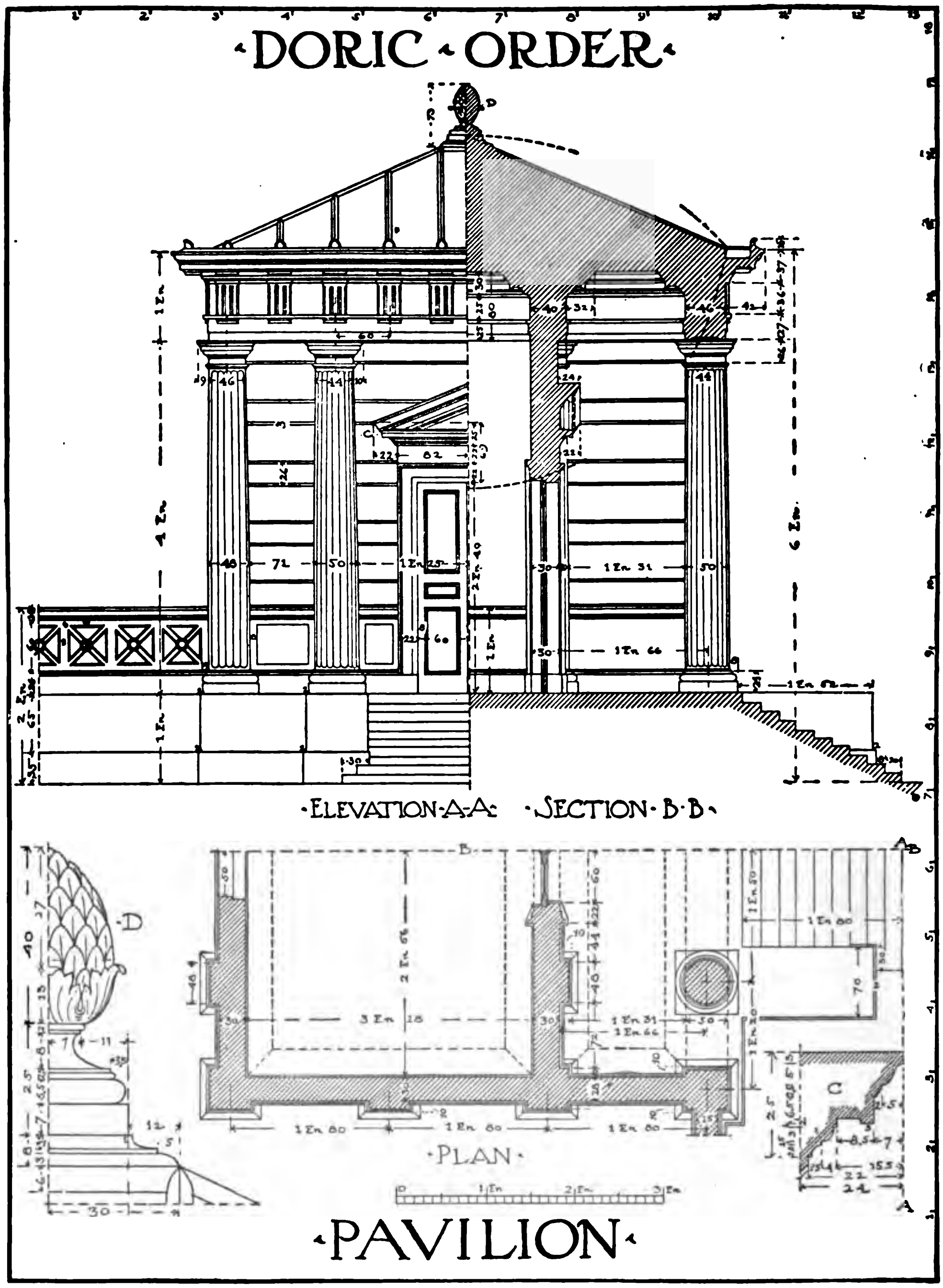


PLATE XXXII.

(A reproduction at small size of Portfolio Plate XXXII.)

160. The plan of the chapel is a square, having on the side of the principal facade, a projection formed by two columns placed upon pedestals and enclosing an arch whose proportions are like those of Fig. 25, this projection being crowned by a pediment. The opposite side has a semi-circular projection, in which is located a niche in which the altar may be placed.

161. The entablature surrounds the entire building, but the triglyphs are found only beneath the projecting pediment of the main facade. The building itself is surmounted by a low attic in the form of a plain parapet, above which are two steps forming a base for the domical roof.

162. The interior of the chapel is a square with its floor raised three steps above the exterior level. Pendentives starting at the spring line of the arches form the transition from the square plan of the chapel to the circular cornice and the semi-circular vault or dome.

163. At the side of the facade is indicated the commencement of a retaining wall, with a grille, which might be continued to enclose a plot of land.

PLATE R.

164. Exercise R is a circular temple (Plate XXX, and plan Fig. 29) with a pedimented porch or portico, showing the use of the order set upon a dado around the interior walls. The ceiling is domical, with an opening in the center, and is ornamented on the under side by a series of recessed panels called caissons or coffers. This plate, like the one preceding, is to be drawn at the size of 13×18 inches.

165. Plate XXX shows an Ionic portico or porch attached to an edifice circular in form. The circular hall is six entablatures twenty parts in diameter, and the thickness of the wall is fifty parts. The perimeter of the hall is divided by pilasters of a smaller order than that on the exterior into twelve bays, as shown in the plan in Fig. 29. The difference in size is due to the pedestal, ninety parts in height, on which the pilasters are placed.

The scale for this interior order is obtained by dividing the total height of the pilaster and its entablature into five parts (each part representing one entablature of the interior order).

166. This circular hall is covered by a spherical cupola or dome, divided into caissons or coffers, the drawing of which constitutes the most interesting part of this exercise; it will therefore be explained as clearly as possible. It is illustrated on Plate XXX.

167. The projection of the interior pilasters being ten parts (at the scale of that order) from the face of the wall, the interior diameter of the springing of the cupola is six entablatures. Draw a half plan of the cupola, dividing its circumference into twelve equal parts and then draw the radii; lay off on each one of these radii, outside the circumference, the profile of a rib and the two coffers one on each side of the rib, each eighteen parts wide, and the two coffers seven parts each and three parts in depth. Next draw in on the plan two semi-circles, one of three entablatures and three parts radius, the other of three entablatures six parts radius. Having thus established the whole profile of the springing of the cupola, draw from each division a radius to the center; then show above this plan, centering on the same axis, the section of the cupola, whose center will be found forty parts below the first horizontal course. This height of forty parts forms a congé with an astragal above the cornice. The cupola is divided into five rows of caissons whose height is relative to their width. Notice that the first band above the astragal is fifteen wide; draw the vertical line from the point A (section) to the point A (plan); draw the quarter circle A which intersects at E and F the lines of the rib. Take from the plan the width EF and lay it off from A to B along the curve on the section, thus obtaining the height of the first row of caissons. From the point B (section) draw a vertical to the (plan) and draw the quarter circle through B′ in plan intersecting the radii at G and H. This distance (G H) laid off along the curve from B to C shows the width of the second horizontal band. Now project the point C (section) to C′ (plan) and draw the quarter circle C′ on which C′ D′ will give the height of the second row of caissons which will be laid off from C to D along the curve in the section. Continue this operation up to the fifth row of caissons. As to the widths of the coffers, they are found on the plan of each row of caissons and consequently diminish gradually with them. The profile of the caissons is formed in the section in this way and their location is found in plan. From

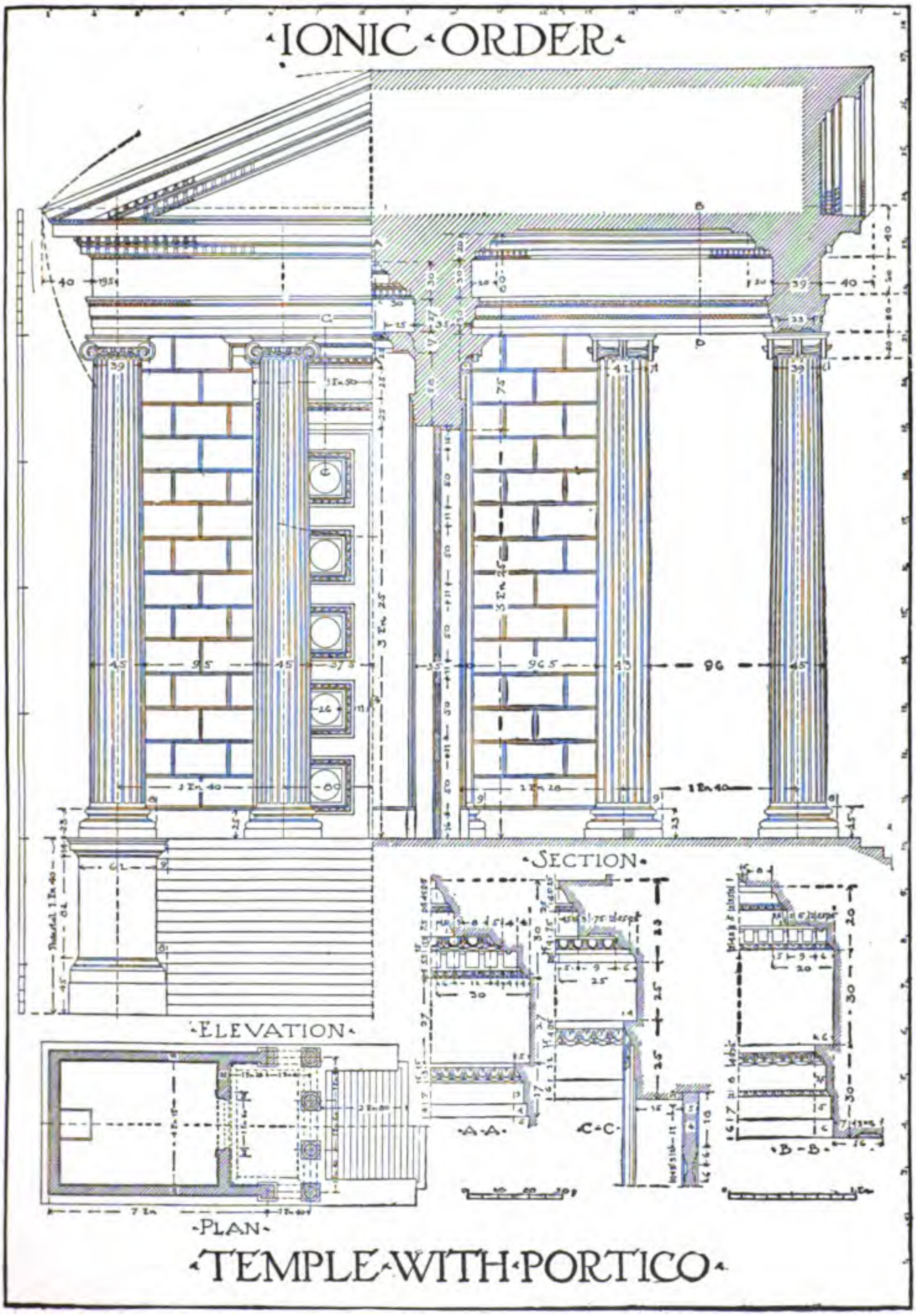


PLATE XXXIII.

(A reproduction at small size of Portfolio Plate XXXIII.)

156. The front is composed of three divisions separated by columns or pilasters. In the center is the archway of the porch and at each side is a window whose sill is supported by consoles, and surmounting the outside frame are consoles of a different character which support the cornice and pediment. These details are shown in A, B and C on this plate. The same details may be applied to the door of the porch.

The windows at the side are similar to those on the principal elevation. The entablature is surmounted by a balustrade divided by pedestals carrying vases; the details of these balusters and of the vases are shown on this plate.

157. The porch is square in plan but has a ceiling or "cupola" in the form of a dome or spherical vault; that is, the ceiling has the shape of a segment of a sphere, whose radius is 2-En and 20 parts, as shown in the sectional elevation in Plate XXVIII. This kind of ceiling requires explanation. The ceiling must be supported on the walls of the porch, which is square in plan, but the domical ceiling is circular in plan; therefore a horizontal section of the porch at the point where the walls end and the ceiling begins will show a square for the section of the walls and a circle for the section of the ceiling. These two geometrical figures must be joined in some way so that the walls will support the ceiling and the ceiling cover all the space enclosed by the walls.

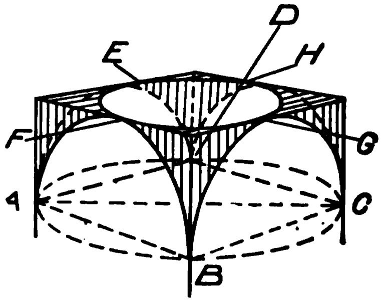
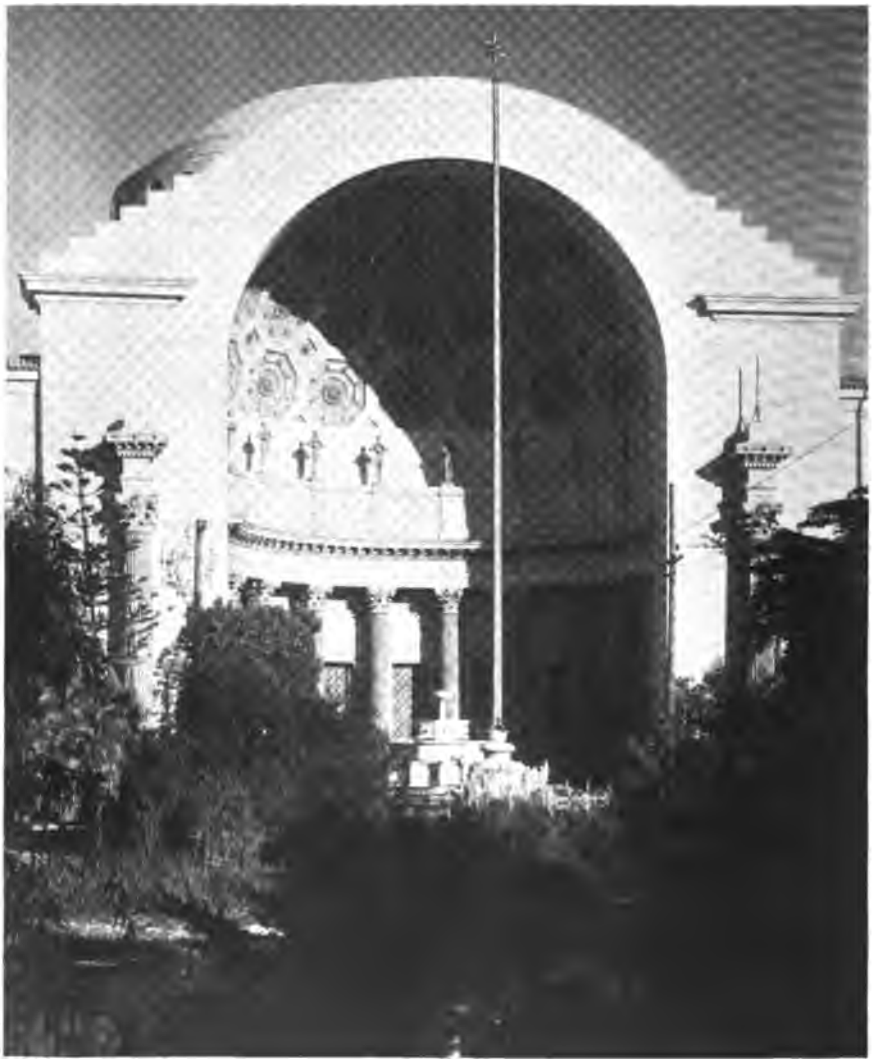


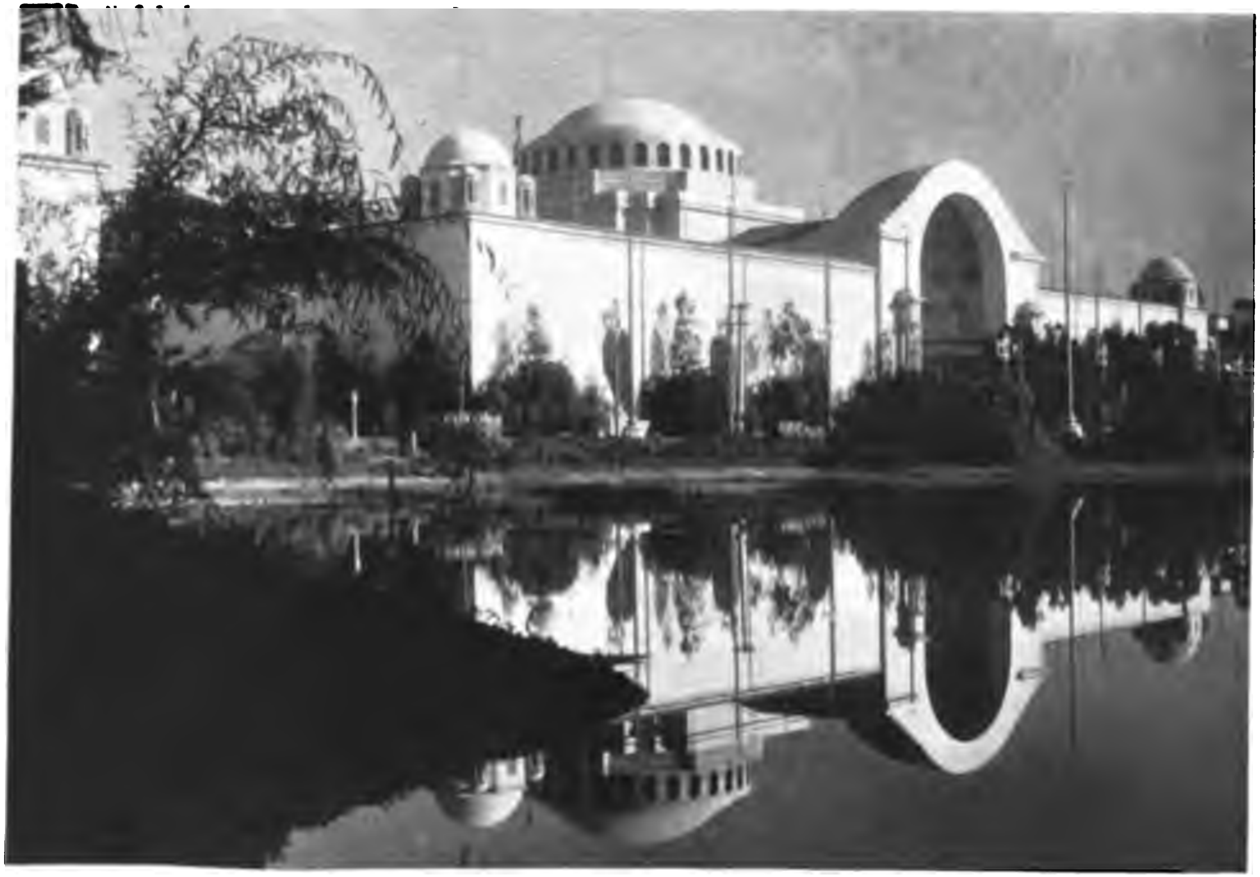
Fig. 28.

Whenever a square space is to be covered by a dome, the semi-diagonal of the square may be taken as the radius for the circle which forms the base or springing line of the dome. Fig. 28 shows at A B C D such a square and circle. If the four walls which form the sides of the square building are now continued upward, they will cut into the spherical segment whose base is represented by the circle, since this circle overhangs the square on all four sides. The figures cut from the domical surface by the walls will be segments of circles,—the intersection of a plane with a segment of a sphere. These segments of circles are shown in plate XXVIII



DETAILS OF HALF DOME—PORTAL OF VIGOR—EDUCATIONAL BUILDING AT PANAMA-PACIFIC INTERNATIONAL EXPOSITION

Bliss and Faville, Architects, San Francisco, California



ONE OF THE FAÇADES OF THE EDUCATIONAL BUILDING SHOWING PORTAL OF THOUGHT AT THE RIGHT CENTER,
PANAMA-PACIFIC INTERNATIONAL EXPOSITION
Bliss and Faville, Architects, San Francisco, California

as the semi-circular arches of radius 1-En and 50 parts, which cover the doorways. A horizontal section taken through the dome at the elevation of the crowns of these circular segments will show a circle which (in plan) will be inscribed in the square formed by the four walls, as shown by the smaller circle E F G H in Fig. 27. This circle is also shown dotted in the plan in Plate XXVIII.

The spherical surface which forms the ceiling of the porch has now been cut into, *first* by the four walls as they are continued upward from the springing line (A B C D) of the dome, and *second*. by a horizontal plane (E F G H) passing through the crowns of the four arches cut from the sphere by the walls. All that is left of the spherical surface is a triangular segment E D H in each corner. This portion of the ceiling is called the pendentive. In Plate XXVIII an elevation of the pendentive is shown at P.

158. The horizontal plane at the crowns of the arches cuts out from the spherical surface a circle (E F G H), which may now be covered over by a dome, or segment of a sphere, which may spring directly from it. In Plate XXVIII this circle is represented in elevation by the first horizontal line of mouldings above the arches. In this particular case, the domical ceiling or cupola does not spring directly from this circle but a small cylindrical band, or entablature, is built up above it for a height of 90 parts, from the top of which the ceiling springs.

PLATE Q.

159. The subject of this exercise (Plate XXIX) is a commemorative chapel of the Denticular Doric Order, and is to be drawn at the size indicated—13″×18″. This is the first of three exercises where a dome plays an important part in the exterior effect of an edifice. In any study, in elevation, of a building employing a dome or cylindrical story, it must be remembered that, in perspective, that portion which is circular in plan looks considerably smaller with reference to the square base from which it springs, than it does in any elevation,—on account of the difference in plan between a square, and a circle which is contained within such a square;—in other words, the circle remains of the same diameter if seen from any point; while an object square in plan, seen from any other position than in direct elevation, has its width considerably increased by the projecting corners.

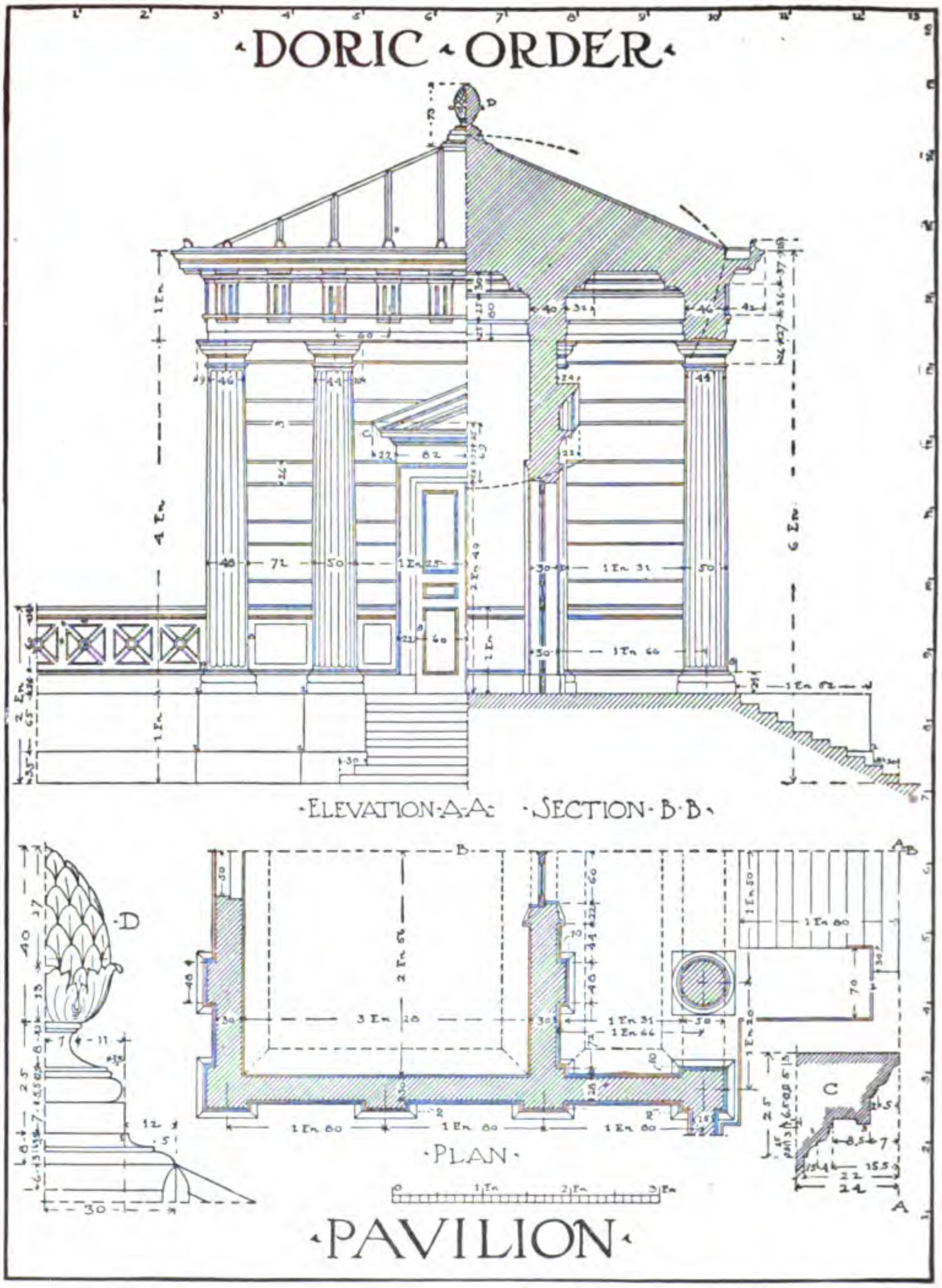


PLATE XXXII.

(A reproduction at small size of Portfolio Plate XXXII.)

160. The plan of the chapel is a square, having on the side of the principal facade, a projection formed by two columns placed upon pedestals and enclosing an arch whose proportions are like those of Fig. 25, this projection being crowned by a pediment. The opposite side has a semi-circular projection, in which is located a niche in which the altar may be placed.

161. The entablature surrounds the entire building, but the triglyphs are found only beneath the projecting pediment of the main facade. The building itself is surmounted by a low attic in the form of a plain parapet, above which are two steps forming a base for the domical roof.

162. The interior of the chapel is a square with its floor raised three steps above the exterior level. Pendentives starting at the spring line of the arches form the transition from the square plan of the chapel to the circular cornice and the semi-circular vault or dome.

163. At the side of the facade is indicated the commencement of a retaining wall, with a grille, which might be continued to enclose a plot of land.

PLATE R.

164. Exercise R is a circular temple (Plate XXX, and plan Fig. 29) with a pedimented porch or portico, showing the use of the order set upon a dado around the interior walls. The ceiling is domical, with an opening in the center, and is ornamented on the under side by a series of recessed panels called caissons or coffers. This plate, like the one preceding, is to be drawn at the size of 13×18 inches.

165. Plate XXX shows an Ionic portico or porch attached to an edifice circular in form. The circular hall is six entablatures twenty parts in diameter, and the thickness of the wall is fifty parts. The perimeter of the hall is divided by pilasters of a smaller order than that on the exterior into twelve bays, as shown in the plan in Fig. 29. The difference in size is due to the pedestal, ninety parts in height, on which the pilasters are placed.

The scale for this interior order is obtained by dividing the total height of the pilaster and its entablature into five parts (each part representing one entablature of the interior order).

166. This circular hall is covered by a spherical cupola or dome, divided into caissons or coffers, the drawing of which constitutes the most interesting part of this exercise; it will therefore be explained as clearly as possible. It is illustrated on Plate XXX.

167. The projection of the interior pilasters being ten parts (at the scale of that order) from the face of the wall, the interior diameter of the springing of the cupola is six entablatures. Draw a half plan of the cupola, dividing its circumference into twelve equal parts and then draw the radii; lay off on each one of these radii, outside the circumference, the profile of a rib and the two coffers one on each side of the rib, each eighteen parts wide, and the two coffers seven parts each and three parts in depth. Next draw in on the plan two semi-circles, one of three entablatures and three parts radius, the other of three entablatures six parts radius. Having thus established the whole profile of the springing of the cupola, draw from each division a radius to the center; then show above this plan, centering on the same axis, the section of the cupola, whose center will be found forty parts below the first horizontal course. This height of forty parts forms a congé with an astragal above the cornice. The cupola is divided into five rows of caissons whose height is relative to their width. Notice that the first band above the astragal is fifteen wide; draw the vertical line from the point A (section) to the point A (plan); draw the quarter circle A which intersects at E and F the lines of the rib. Take from the plan the width EF and lay it off from A to B along the curve on the section, thus obtaining the height of the first row of caissons. From the point B (section) draw a vertical to the (plan) and draw the quarter circle through B′ in plan intersecting the radii at G and H. This distance (G H) laid off along the curve from B to C shows the width of the second horizontal band. Now project the point C (section) to C′ (plan) and draw the quarter circle C′ on which C′ D′ will give the height of the second row of caissons which will be laid off from C to D along the curve in the section. Continue this operation up to the fifth row of caissons. As to the widths of the coffers, they are found on the plan of each row of caissons and consequently diminish gradually with them. The profile of the caissons is formed in the section in this way and their location is found in plan. From

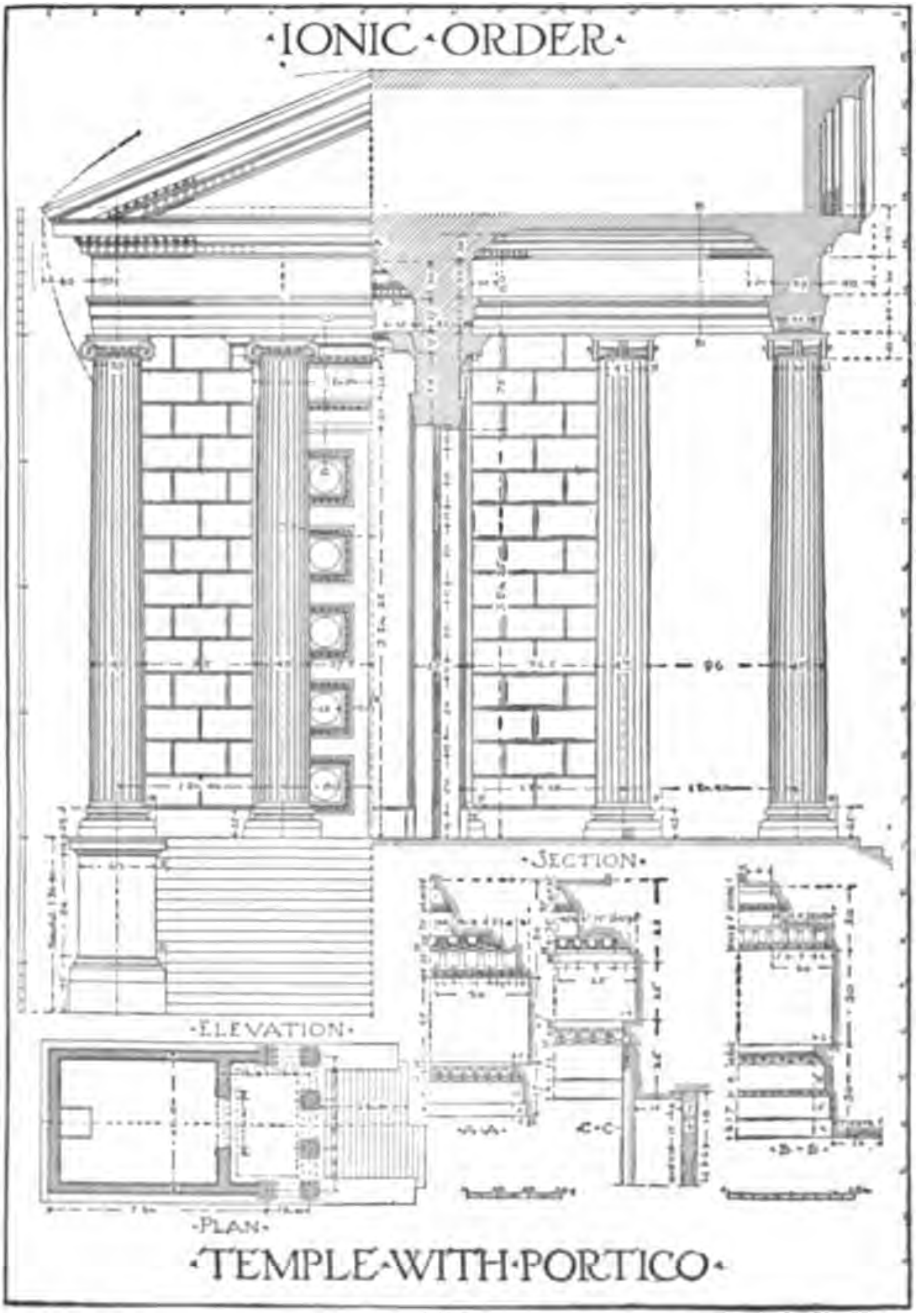


PLATE XXXIII.
(A reproduction at small size of Portfolio Plate XXXIII.)

each angle of the profile of the caisson draw a horizontal line through the section; this will give the horizontal lines on which all the points of intersection will be found in projecting the verticals from the corresponding points in the plan. Thus, from the point I (plan) which is found on the upper line of the topmost row of caissons, draw a vertical up to the point I (section) which is on the corresponding line in the section; from the point J (plan), which is found on the lower line of the same row of caissons, draw a vertical to the point J (section). Thus the circle I (plan) is represented in the section by the horizontal line I; the circle J, in the plan, by the horizontal J in section, the circles K, L, M, and N in plan by the horizontals K, L, M, and N of the section. The points of intersection of the radiating ribs in plan with the circular segment I, should be projected vertically to the horizontal I in the section. Those of the circle J, to the horizontal J; those of the circles K, L, M, and N, to the corresponding horizontals in the section. In this manner on each horizontal of the section, are found the points by means of which the curves of the bands may be drawn.

168. To draw the elevations of the stones of the circular part, it is necessary to show their location in plan, and, starting from the semi-pilaster which forms the junction of the portico with the circular walls, the stones are of the same length as those of the straight wall at the back of the portico. For the dentils of the circular cornice, the divisions in plan must also be made. The plan of this temple is shown in Fig. 29.

PLATE S.

169. In Plate XXXI is shown a temple that is entirely circular in plan and surrounded by a circular colonnade of Corinthian columns. The ceiling of the domed interior is similar to that of the building shown in Plate XXX, while the ceiling of the narrow porch outside the wall of the building is ornamented with coffers or panels, as is shown on the plan below. This temple is also to be drawn out to the size of 13×18 inches.

170. The axis of the colonnade is a circle of a radius of three entablatures and twenty parts, this circle being divided into twenty equal parts which give the spacing of the columns. The width of

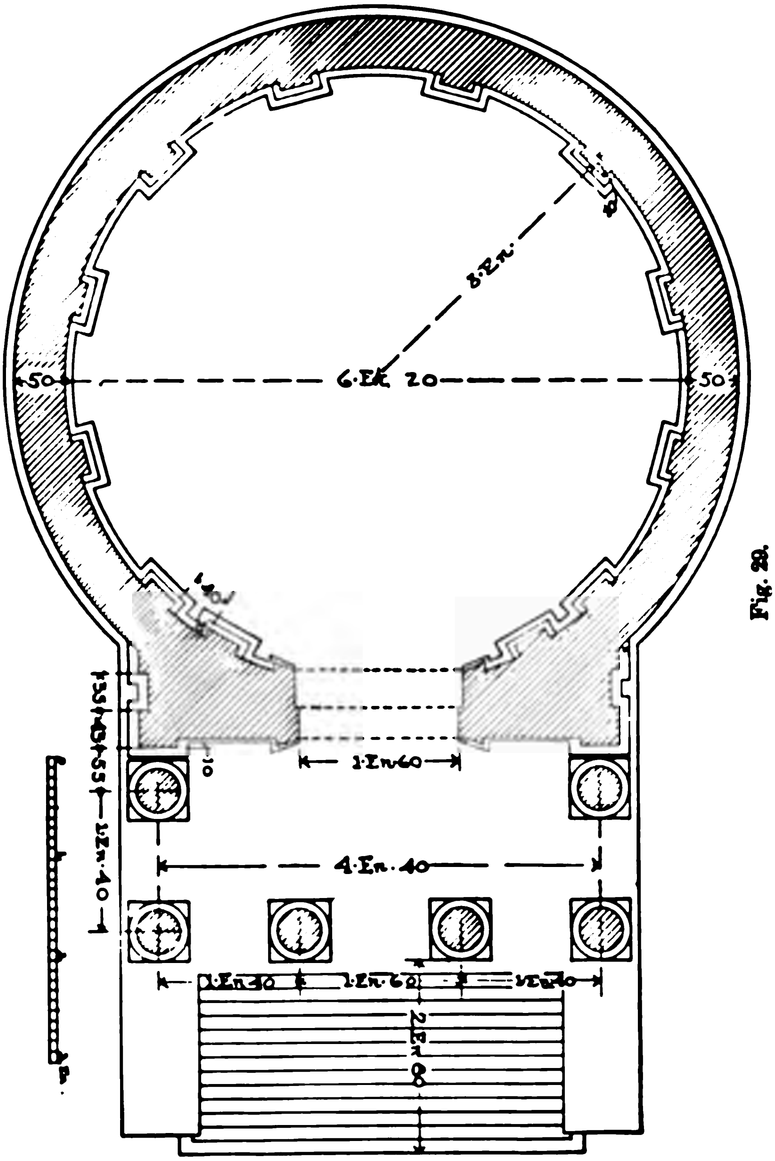


Fig. 29.

the portico, from the axis of the columns to the circular wall which is thirty parts thick, is one En. The colonnade is raised on a circular platform reached by seven steps, while the floor of the hall is raised one step above this level. The entrance to this hall

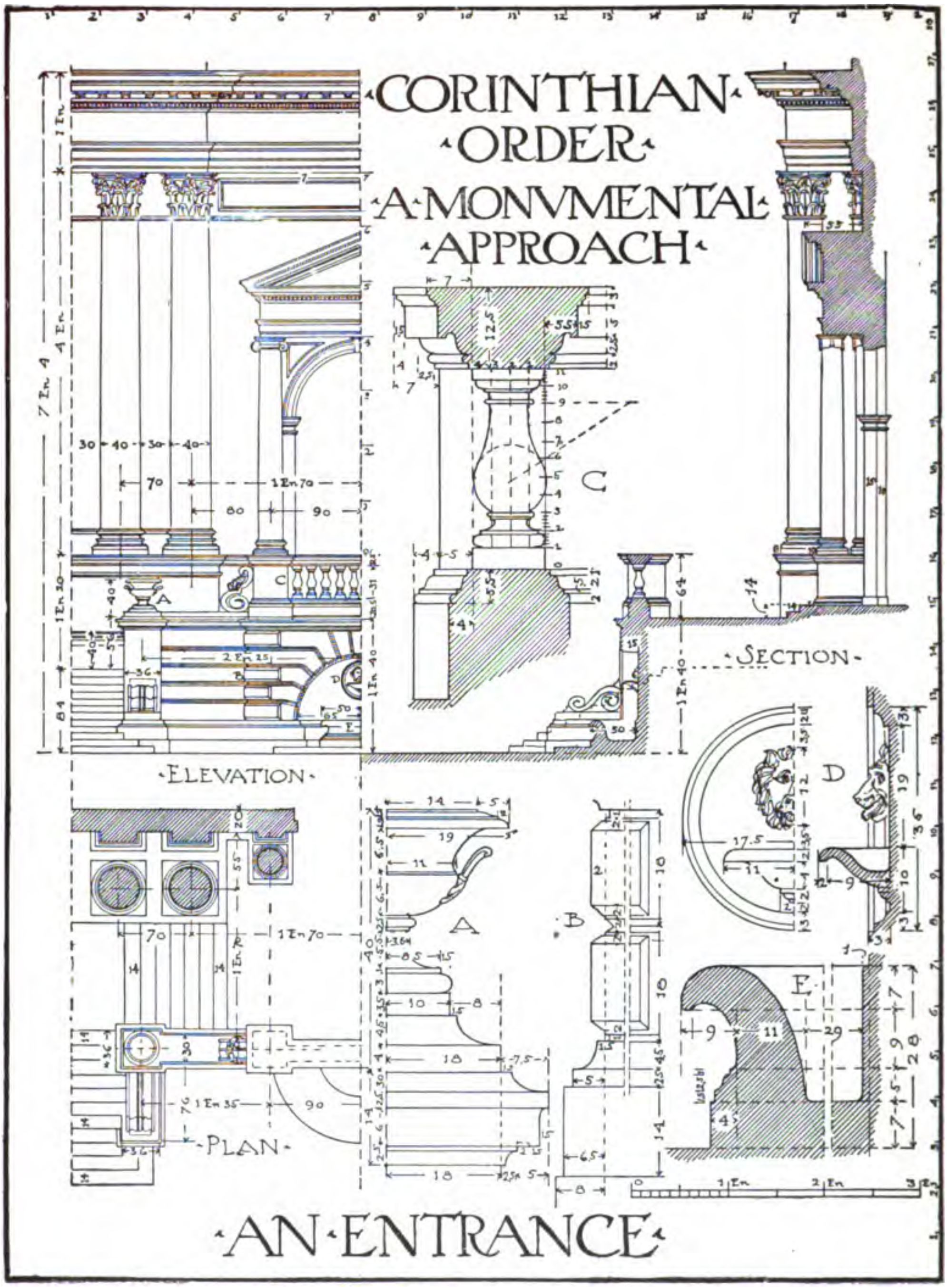


PLATE XXXIV.

(A reproduction at small size of Portfolio Plate XXXIV.)

is a doorway two entablatures seventy-nine parts in height by one entablature and twenty parts in width. Half of the plan shows the arrangement of the columns and shows that their capitals are placed square with the radii which pass through the columns. It will be necessary in drawing an elevation, to draw the plan of all the capitals since each one is seen in a different position, and it is only by means of the plan that the position of the details which make up the capital can be determined. Notice that the plinths of the bases, which, up to the present time have been square in plan, are here circular because their corners would partially block up the spaces between the columns. The other quarter of the plan shows the disposition of the ceiling of the portico, the soffit of the exterior cornice, and the caissons of the cupola.

171. The ceiling of the portico rests upon a small cornice and is divided into panels, which correspond to the columns and the spaces between the columns. In order to draw the caissons of the cupola, it will be necessary to repeat Plate R and go back to this study for the details of the lantern.

PLATE T.

172. In Plate XXXII is found a pavilion in the Mutular Doric Order. It is to be drawn with the border line of the same size as in the other plates, but, by omitting the plan here shown, it will be possible to increase the height of the building considerably and still bring it within the outlines of the drawing.

173. This small building is raised ten steps above the level of a garden, and is composed of a portico "in antis," giving access to the room beyond. The plan forms a square from center to center of the corner pilasters. This dimension corresponds to nine divisions, center to center, of the triglyphs in the entablature.

174. The four pilasters of the lateral facade form three regular bays of three spacings of the triglyphs. The intercolumniation in the center of the principal facade or portico is three entablatures, five times the distance from the center of one triglyph to the center of another, which is sixty parts, and the space between the antae and the columns is one entablature and twenty parts, or twice the distance between the triglyphs, center to center. The depth of the portico corresponds to one bay of the pilasters of the lateral facade, and the divisions of the pilasters of the rear facade correspond to the columns of the portico. In the middle of this rear facade is found a window which lights the interior; this window is twice its width in height and is placed above a wainscot of the height (1 En) shown in the section.

175. The entrance door is decorated with a frame similar to that in Plate XXV, and has an entablature with a pediment whose details are given on this plate at C. The entablature which surrounds the ceiling of the portico and of the hall is also the same as was used in Plate XXV.

176. The bases of wall and portico, and of the lateral and rear facades, are composed of a plain pedestal, or dado, one entablature in height, and with a rusticated part three entablatures high. "Rusticated" applies to masonry work in which the joints are strongly emphasized. The dado has a plinth base of a height corresponding to the height of the column base, and a cap fourteen parts high. The bead and congé of the bases continue around and above this plinth; the rusticated stones are alternately twenty-six and sixty-eight parts wide with sinkages of two parts.

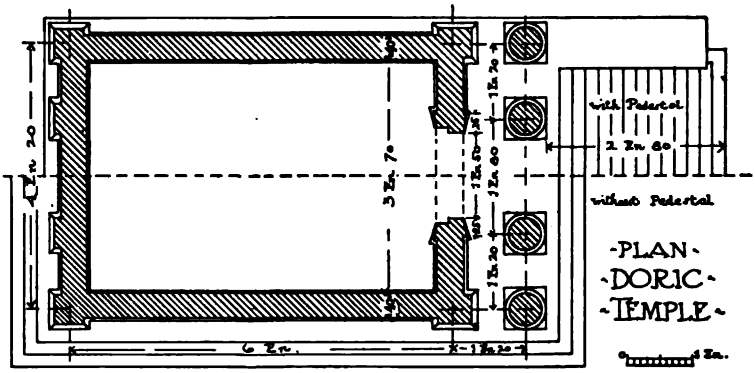


Fig. 30.

177. The roof is pyramidal in form and is crowned by a pineapple, of which the detail is given at D in this plate, XXXII, and the balustrade shown at the left-hand side of the facade would be the rail of a terrace on the edge of which this pavilion is located. This terrace, although the pavilion does not communicate with it, would be accessible by flights of steps placed laterally. For this would be practicable below this space. The entrance door of the edifice is in the form of an arch, covered with a pediment of the Ionic Order. The Corinthian columns forming the corners of the projection are coupled, that is to say, the space which separates them is less than the minimum of the regular intercolumniation.

184. The student is required to design, arrange and draw upon a plate, the size of 20″ × 28″, some such problem as is shown in Plate XXXIV, termed an Entrance or Monumental Approach. He may use any orders that he may choose for this problem, but should remember to maintain a proper relation between them in scale and size. He must not follow exactly this arrangement but must introduce such a variety in the plan as will give him a problem in elevation different from the one here solved.

in the preceding exercise the full facade of the temple is shown, while in this plate of the Ionic Order a half facade and section are to be combined as illustrated.

181. The exterior face of the wall is formed with rusticated joints, that is to say, the joints of the stones form triangular recesses or grooves as shown at C, Plate XXIX. This decorative scheme is at the same time a logical construction because, the angles of the stones being obtuse, the edges are less liable to be broken off.

PLATE W.

182. This exercise is one of superposition and, as the same principle may be applied throughout the use of the other orders, it is believed that one drawing devoted to this subject will be amply sufficient. The student is required to reproduce the drawing shown in Fig. 23, at the size of 13″×18″ and to complete in his drawing all the details of the mouldings, windows, doorways, etc., where the same are only blocked in upon this figure. The considerations in regard to superposition, stated in the text in paragraphs 116 to 132, must be carefully observed.

PLATE X.

183. The subject of this study, Plate X, is the central part of the facade of an edifice; assume it is to be a library or public building of a similar character. The Corinthian Order is raised on a series of pedestals. The interior level of the edifice is raised above the exterior ground level and is reached by a staircase which will prove to be an interesting part of this study. This staircase is in two parts, each part composed of two flights with an intermediate landing. The first flight has twelve risers up to the landing; the second has eight risers up to the top of a wide landing which is placed before the entrance and on the axis of the edifice. A balustrade with two pedestals, on which might be placed statues or candelabras, surmounts the supporting wall of the landing. This supporting wall is finished on each side by a pillar on which is placed a vase, and is decorated with rusticated joints. The central part, corresponding to the balustrade, forms a projection; a niche decorated with a fountain and semi-circular basin would be practicable below this space. The entrance door of the edifice is in the form of an arch, covered with a pediment of the Ionic Order. The Corinthian columns forming the corners of the projection are coupled, that is to say, the space which separates them is less than the minimum of the regular intercolumniation.

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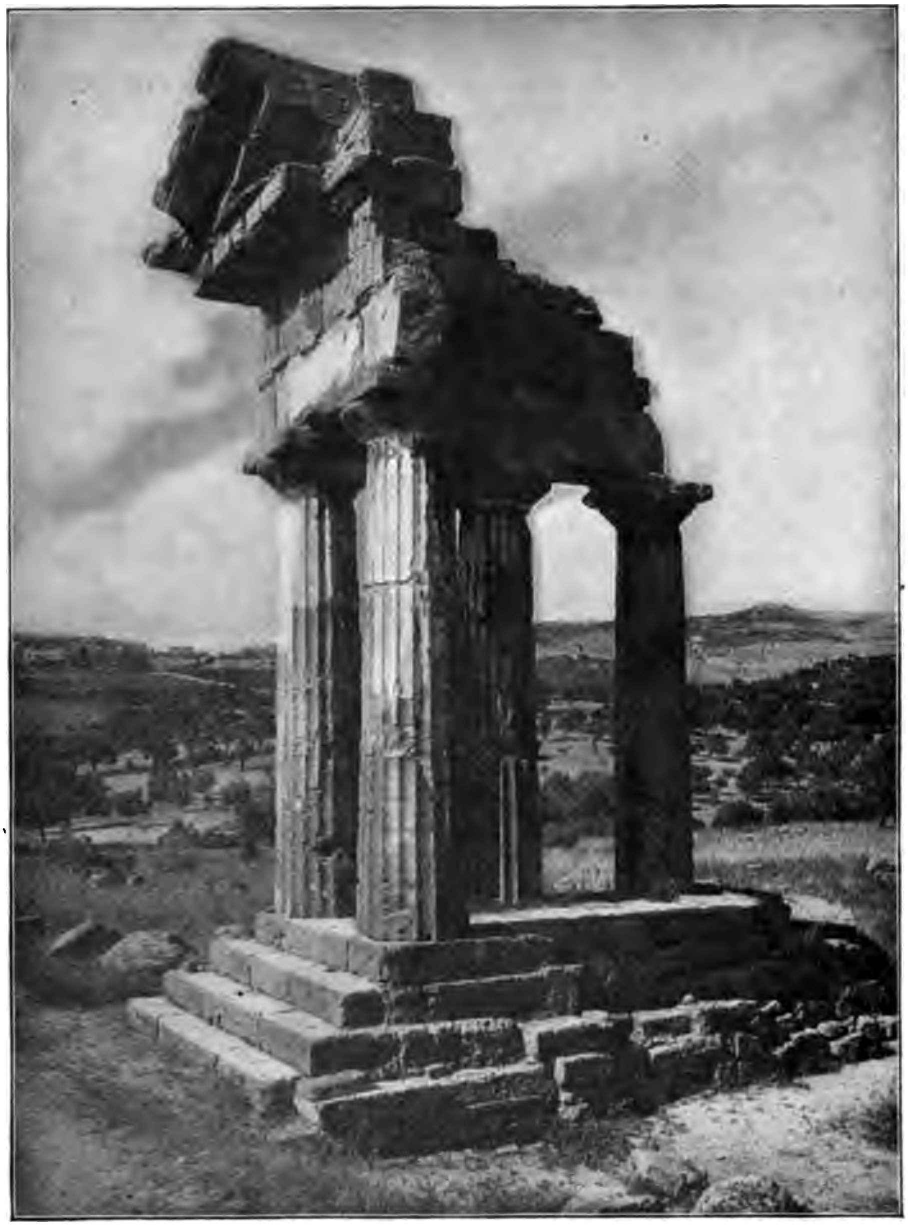


Remaining Corner of Greek Doric Temple of Castor and Pollux, Girgenti, Sicily. Illustrating Construction and Lintel Principle of Greek Temple Architecture.

STUDY OF THE ORDERS

PART II

THE CLASSIC GREEK ORDERS

Of ancient buildings, the only ones which have come down to us in any sort of preservation are the temples built for the religious worship of the various peoples. All their domestic architecture was evidently of such an ephemeral character that it has long since disappeared. It is therefore evident that religion, of whatever form, has been directly responsible for the growth of architecture to the monumental style to which it has since attained, as these nations might otherwise never have invented for their ordinary shelters, or even for the palaces of their kings and rulers, the impressive forms that have survived. But, more than this, we know that many of the different parts of architecture had at one time a direct religious significance and meaning. Indeed, there seems to have been an especial pride evinced in adding this element of symbolism to the architectural forms in common use.

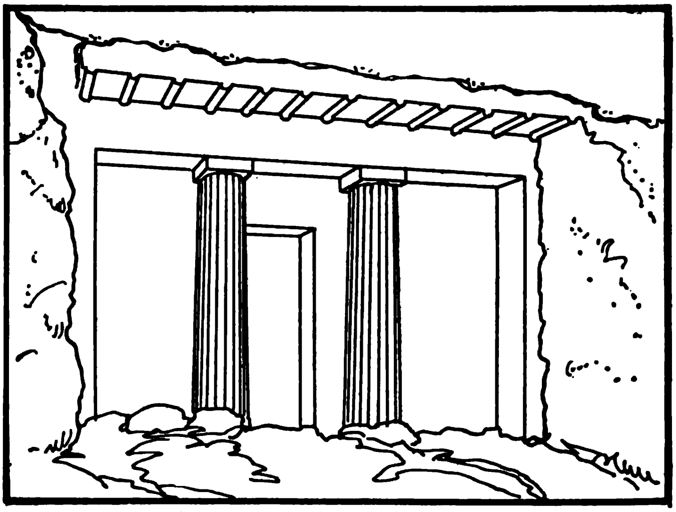


Fig. 81. Egyptian Rock-Cut Temple.

The Greek temples, in which the Order as we study it to-day first assumed its definite form, were as a rule the simplest and most elemental kind of buildings—a rectangle longer than its width, with two roof planes leaning upon each other and forming a ridge at the center with a gable at each end.

Derivation of Greek Temple. The Temple of Diana Propylæa at Eleusis is an instance of a temple that shows the characteristics of Greek architecture at its simplest and best. The elevation and plan of the porch, as well as the details of its ornament and construction, are both well shown in the two illustrating plates. The entrance porch (Plate XXXV), indicates a close relationship and a possibly direct derivation from the Egyptian rock-cut temple (Fig. 31), as the drawings show; and its plan (Fig. 32) displays the simplest use of the Doric column *in antis*, or placed between the two pilasters (*antæ*)that are formed on the end of the side walls of the building.

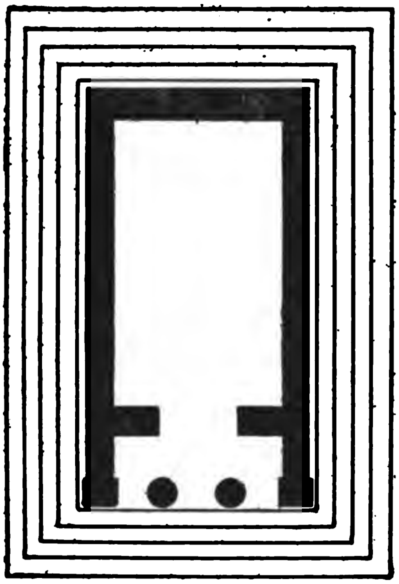
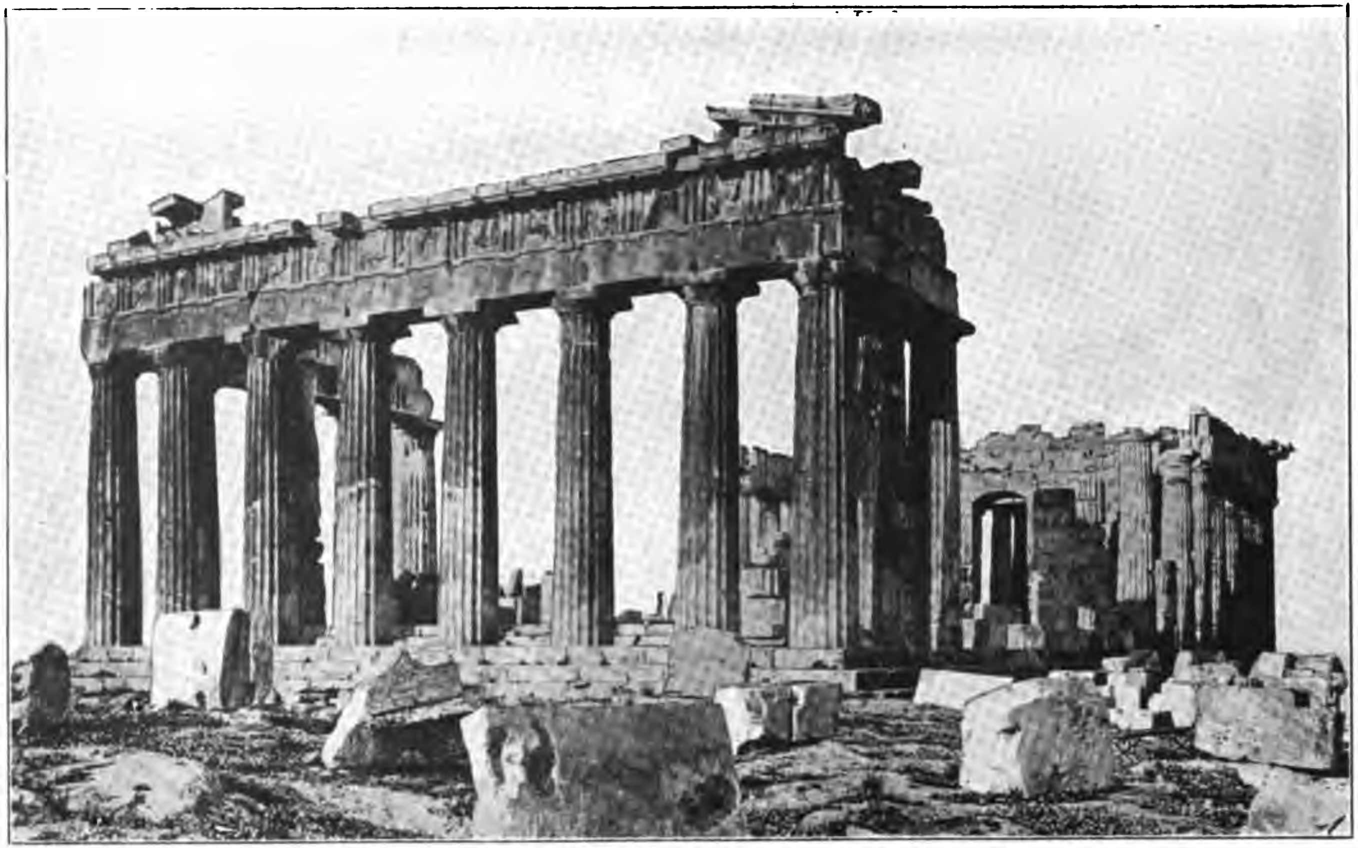


Fig. 32. Plan of Temple of Diana Propylæa at Eleusis.

The plain outside enclosing wall of the Egyptian and the early Greek temples was soon replaced by an exterior row of columns, and the stone wall placed inside these, as in the plan of the Temple of Theseus (Fig. 33), so that only the central portion of the building was actually enclosed.

The Greek columned temple passed rapidly through many stages of development until it reached in the Parthenon its highest type; and still the plan (Fig. 34) shows how little it has changed in its essentials from the small Temple of Diana Propylæa; but by replacing the plain exterior side and rear walls by a single or double row of columns, a great addition has been made to the impressive exterior effect of the whole.

This change must be recalled when studying the entablature of



RUINS OF THE PARTHENON, CROWNING THE ACROPOLIS AT ATHENS.

This temple to Pallas Athene (Minerva), the tutelary deity of Athens, embodies the consummation of Greek architectural art. Built about 438 B. C. by Pericles. Ruined in 1687 A. D. by an explosion of gunpowder stored in it by the Turks, during a siege by the Venetians. It is a Greek Doric peripteros of 8 by 17 columns, on a stylobate of 3 steps, the highest measuring 101 by 228 feet. In the cella stood the famous ivory-and-gold statue of Athene by Phidias.

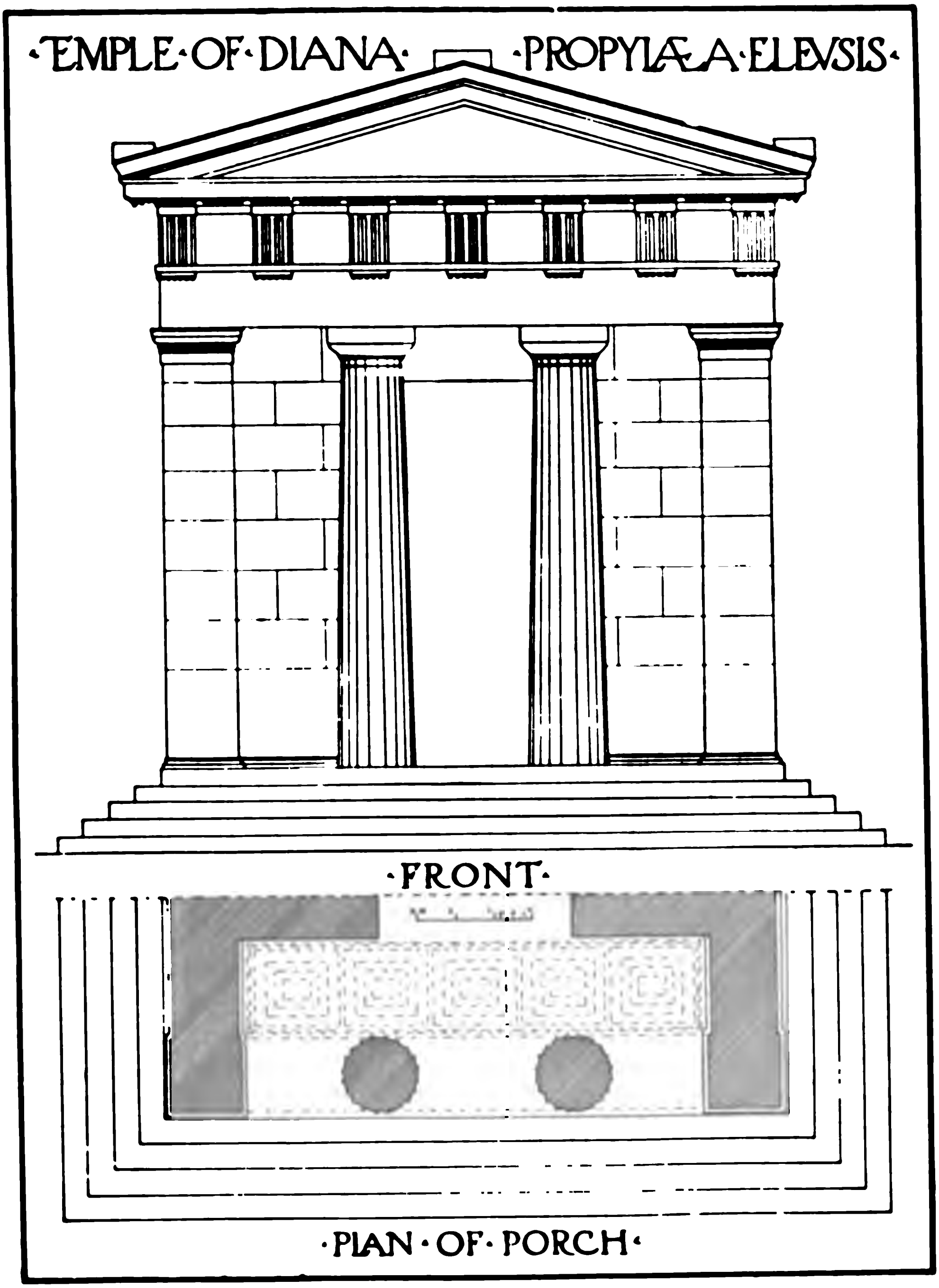


PLATE XXXV.

(A reproduction at small size of Portfolio Plate XXXV.)

the Greek Doric order, as it will help to explain the characteristics that go to make up the frieze and cornice, if we remember that it probably first crowned a wall and not a colonnade.

Development of the Column. In these Greek temples, wholly of stone construction the spacing and size of the columns, as well as the development, artistic and structural, of their buildings must first have been determined by the various considerations of material. As the entire Greek system of architecture was based upon the principle of the lintel (Frontispiece), we know that the spacing of the column was governed by the length of stone blocks which they were able to quarry and place across and upon the columns with some assurance of their supporting the weight of the roof; and so also the size of the column itself was probably first determined more by the ease of quarrying the blocks of stone of which they were composed, and of handling and placing them in position, than by any great regard for their

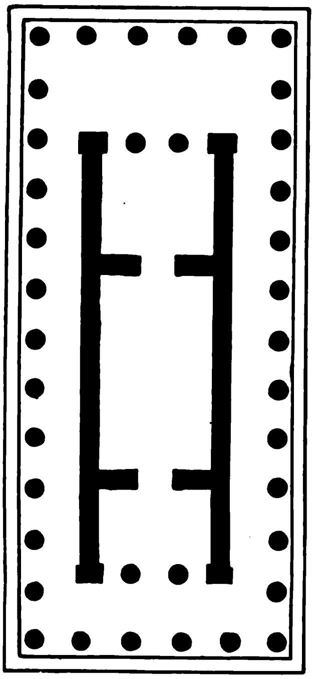


Fig. 33. Plan of Temple of Theseus, Athens.

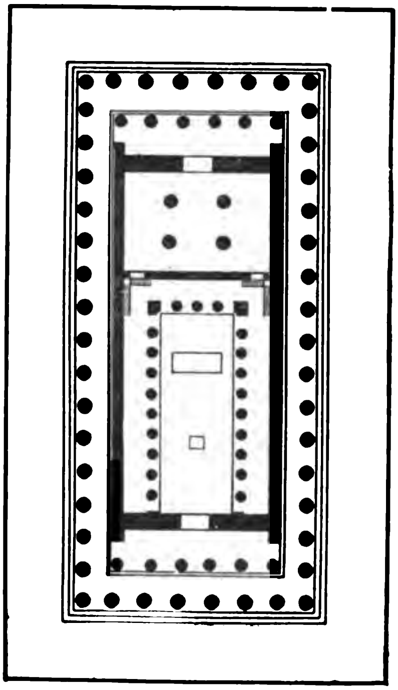


Fig. 34. Plan of Parthenon, Athens.

artistic effect, although this undoubtedly immediately followed.

In the Egyptian and Greek temples, the column developed peculiarities of form that were evidently demanded by the higher artistic cultivation of the people. In the early examples its purpose had been purely structural, but later on it was used to produce an important part of the effect of the building, and while still utilized for structural purposes, it was treated as a decorative unit, until finally the column (or rather the Order) becomes the very basis of Classic architectural design.

Rules of Classic Architecture, Their Use and Misuse. Classic architecture is distinguished from the later and more transitory styles, such as developed during the Romanesque and Gothic periods, by the fact that the various forms composing its parts have been reduced to a fairly definite set of rules.

No other style of architecture has been so consistently developed or has so well stood the test of time. But it must always be remembered that the "rules" to which we have now reduced the Classic Orders, are not to be considered as the principles upon which they were first designed. Rather, these rules and systems of proportioning the details of the Classic Orders of architecture have been invented by enthusiastic theorists and students of later times to fit the old examples. The people who erected these ancient monuments understood no such rules, but rather created their work under the direct influence of a vital artistic instinct and life of which to-day we are imitating the mere empty forms. It must be thoroughly realized, therefore, that in reducing the Orders to the understanding of individuals of a different civilization by a mere "rule of thumb," much of their subtlety and true spirit must have been lost, and that the rule only suggests to us a mere outline or general idea of the true beauty of any one of these Orders. So, while we may not hope to equal or approach their original perfection, experience and constant study may be relied upon to suggest the principles which underlie them and which they represent, and so to help us to produce individual refinements and variations in a modern and therefore truly vital spirit.

The rules, then, which we follow on all Classic work to-day must be considered not as the principles which governed the Greek designers, but as those which we have invented in order to render the use of the Orders easier and more available without great errors of proportion.

It is quite impossible at this day to expect to know the principles which the Classic designers actually followed. Every year there are discovered new variations from the supposed rules which we have applied. It is now known, for instance, that in the Parthenon, at Athens, every supposedly straight line was laid out and determined on some flexible principle of curves proportioned, probably, solely with regard to their final effect upon the eye of the observer.

Superiority of Greek Architecture. Greek civilization developed refinement and subtlety of taste in architecture to a point that architecture has never since attained. The best buildings erected by the Greeks combine such dissimilar qualities as richness, simplicity, magnitude and strength, with refinement and harmony.

Contrary to the general impression regarding the coldness and strict formalism of Greek architecture, probably no people have ever combined Classic architectural forms with more variety, or with more insistence upon the flexibility and interest of their compositions.

Refinement of Lines. No one understood more thoroughly than the Greek artists the abuses and defects of a mathematical system when applied to a vital art. They were compelled to progress beyond this limitation before they succeeded in creating an architecture that was worthy of being included among the Fine Arts; while of no period since has it been possible to give its architecture front rank among them. The ancient Greeks considered the whole effect of their architecture largely with regard to the eye of the beholder, and this principle seems to have been more thoroughly understood by them than by any succeeding nation of builders. As all their masses and details were carefully studied with this optical effect in mind, so nearly all the lines in their work—both horizontal and vertical—curve; and the curves were studied with the apparent intention of counteracting certain awkward optical defects which might be occasioned by the use of a mechanical exactitude in straight and rectangular lines.

These principles the Greeks developed and refined to an almost incalculable degree, while their application was broadened until they subtly varied almost every supposedly straight line. The student of their architecture is nowadays very careful about accepting from casual observation of the effect of the building, the apparent means by which this effect was produced.

Lines in the Parthenon. In the Parthenon, considered as one of the best examples of architecture of all time, late discoveries and more exact measurements have developed the fact that there is probably not an exactly straight line in the entire structure. The most careful study was given to every part of this beautiful building, from every possible point of observation. In the front, for instance, the stylobate upon which the columns rest is slightly higher at the center than at each end, in order to prevent any appearance of dropping at this point as would have been inevitable if it were laid out on a perfectly straight line; the lines of the entablature were in turn slightly raised at the center so that it would not appear to sag; the highest point, again, is not exactly in the center, but to one side, where the building would be seen by anyone approaching from the Propylæa, the entrance to the Acropolis. The columns of the colonnade around the building are all slightly out of the perpendicular; they incline or lean back toward the center, so that the axes, if prolonged to a long distance above the building, would all finally meet at one vanishing point. This is true in all its meanings. Not only does the entire colonnade along the side, for instance, lean back in plane toward the parallel center line of the building along the ridge of the roof, but the columns, as they approach the two ends of the building, lean back toward the center line of the respective elevations. This is true on all four sides of the building, in order to have the sloping lines of the columns correctly intersect at each angle. By referring to the cuts this will be made more clear. Fig. 35 shows two perpendicular sections through the colonnade, with the column placed beyond the face of the enclosing wall of the building. The column at the left is shown with its axis perpendicular and at right angles to a horizontal line. This is the way the Greeks did *not* use the column. At the right is shown a column employed in their customary manner. Here the dotted line dropped from the inside of the architrave of the crowning entablature discloses the fact that the axis of the column is sloping back at the top toward the enclosing interior wall of the building; while the face of the frieze and entablature above also follows, though more slightly, this same gradual slope. In this example the taper of the column is exaggerated in order to emphasize the theory of its arrangement.

Fig. 36 is a plan of the frieze of the Greek Doric Order, showing the columns placed beneath it under every alternate triglyph. This drawing indicates the plans of the columns at the neck and base in relation to each other, and discloses the fact that their centers, while on a perpendicular line *in front elevation*, are not *directly* over each other *in plan*, the center of the column at the neck being placed behind the center at the base in order to produce the effect shown at the right in Fig. 35. At the corner, the center of the column at the neck is necessarily slanted in on *each* elevation, as is shown on this plan. This will indicate the first stage of the development of this theoretical system, which is shown more clearly in Fig. 37, where the plan of the six-columned Greek Doric porch illustrates the complete working out of this theory. Here we find that each column not only leans back from the face of the building, but also that it is shown inclined toward the center point as well, thus equalizing this gradual inclination of the columns from the one at the corner to the center of any facade of the building, where, if a column were placed, it would be directly perpendicular *in elevation* while its neck would still incline back from the face of the building. The almost intangible variation of these columns from the perpendicular was made in order that they would not appear to spread outward at the top, and that at the same time the building would present, in its pyramidal form, a more solid and enduring aspect.

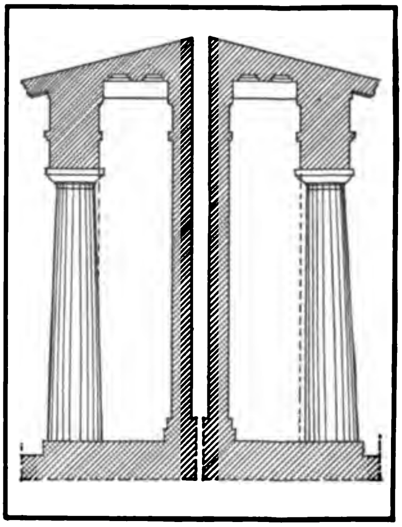


Fig. 35. Sections Through the Colonnade of a Greek Doric Order.

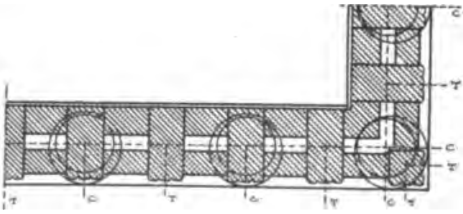


Fig. 36. Plan of Frieze of Greek Doric Order.

Refinement in Detail. We have already remarked that with the progress of architecture the column takes proportions more elegant, and the entablature diminishes in height. We shall also find that at the same time the echinus of the capital—flattened in the old temples and compressed under the weight of the entablature—is straightened and supports with more firmness the abacus. The mouldings become less brutal; the column at the angle receives a diameter a little larger than belongs to the other columns; the rectangular shape which has been taken as the form of the edifice becomes delicately pyramidal, until we arrive at such admirable exexamples as the Temple of Ægina, the Propylæa, the Theseum, and the Parthenon.

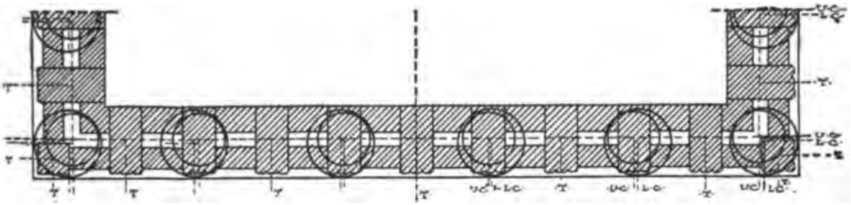
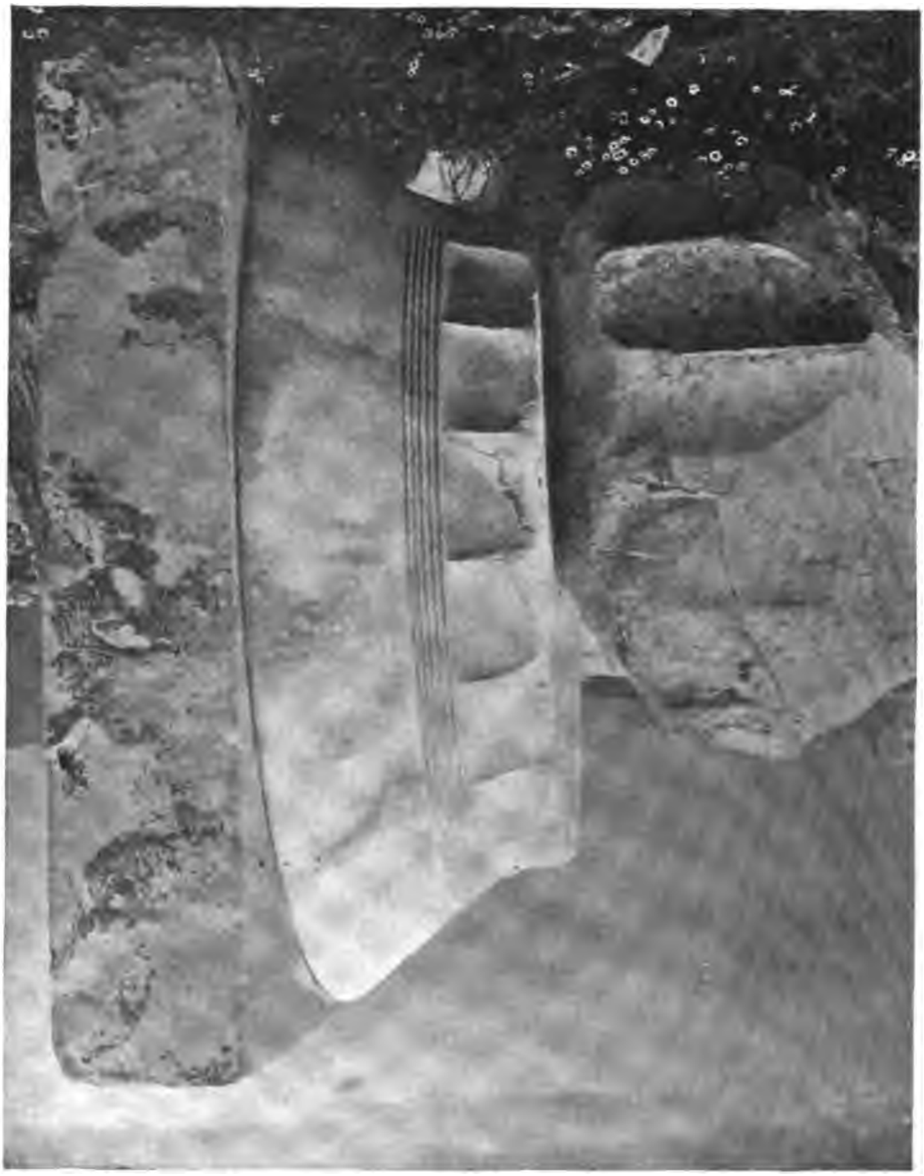


Fig. 37. Plan of Six-Columned Greek Doric Porch.

The Greek Doric Capital. The echinus moulding is considered as the most distinctive of all the sections invented by the Greeks; and, as used in the Doric capital, it received a character that does not pertain to it when used in any other position. In the earlier examples its outlines will be found more rounding in section than in the later ones where it attains to a beautifully studied eccentric curve, neither flat enough to be hard, nor full enough to be weak in effect, until in the Parthenon and Tholos of Epidauros it is refined to an almost straight line. The compared sections of capitals from Corinth, Pæstum, the Temple of Concord at Agrigentum, and the Parthenon at Athens, (shown in Fig. 38), illustrate this progress. The various sections of this cap moulding, from the early, fuller, rounder examples where it spreads out far beyond the shaft, along with the different ways of expressing the variously termed annulets or fillets that separate this moulding from the fluted necking below, show how carefully the Greek sculptors experimented in order to obtain just the effect that they desired. In the later periods of Greek architecture the outline of this echinus moulding is as simple, delicate, and beautiful as any detail that the Greeks have made; and in the best examples it may be considered typical of the refinement and proportions of their architecture. The character of this section,showing the echinus mould-



Greek Doric Capital.
From the Parthenon at Athens.

ing itself in proportion to the abacus, the character of the fillets that divide it from the fluted necking, and the various sections of the recesses taking the place of an astragal that separate it from the shaft, are shown more fully in Figs. 39, 40, 41, 42, 43 and 44. These same illustrations will indicate the relations of the column diameter at the neck and base. But, while interesting in tracing the development of the column, none of the examples are so perfect or so well worthy of reproduction as that used in the Parthenon, shown at a larger size in Plate XXXVII.

It is also generally conceded that the individual parts of Greek architecture appear to best advantage when the general form of the building itself is Greek. Indeed, the beautiful flat curves and mouldings of this style are quite at variance with anything else than the low pediment, flat roof, and general proportions of the old Greek temple buildings.

Inclination of the Roof in Greek and Roman Temples. The very form of roof used on these Greek temples, giving a gable or pediment at each end, enclosing a tympanum which

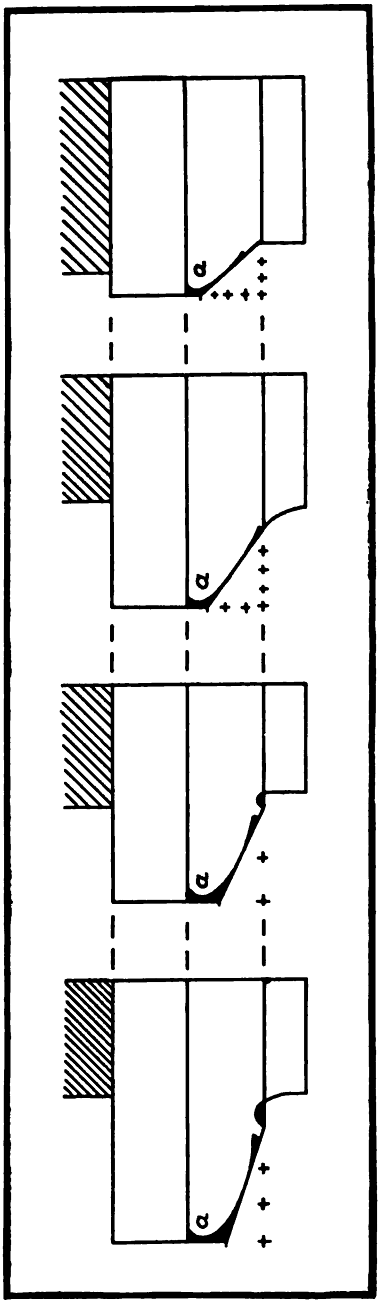


Fig. 38. Comparison of Greek Doric Capital Sections.

was generally decorated with sculpture, is in its slope, simplicity and proportions characteristic of their architectural practice. The inclination of these roofs is very slight. In the Temple of the Erechtheum it is fifteen and one-half degrees; in the Temple of Theseus (Fig. 51) it is fifteen degrees; in the Parthenon (Fig. 45), it is sixteen degrees; while the pediment of the Propylæa (Fig. 88) has an inclination of fourteen and one-half degrees. It may be interesting to mention, in this connection, that in Roman examples this inclination is steeper. Thus, in the pediment of Septimus Severus it is twenty-two degrees; in the Temple of Concord and Mars Ultor, twenty-three and one-half degrees; and in the Temple of Fortuna Virilis, and Antoninus and Faustina, twenty-four degrees.

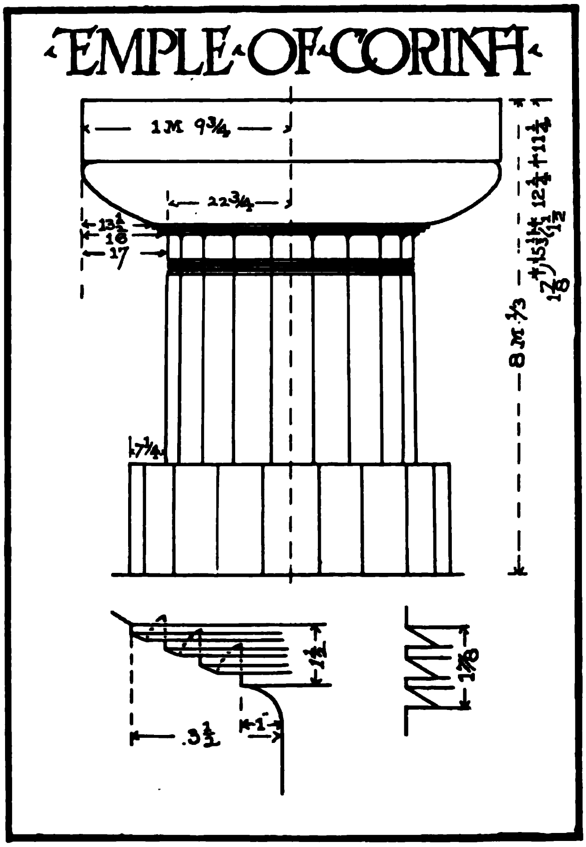


Fig. 39.

The Value of the "Order." The "Order" may be used as the most tangible means of getting at the essential parts of the Greek style, and a study of its forms cannot fail to help towards the appreciation of the beauty of Greek architecture as a whole.

It is also necessary to realize that the Order is not the most important part of the study of Greek architecture. The Greek building, in all its beauty of proportion, existed long before the Order was developed to the point where we study it to-day. The form of roof used on the Greek temples performs, as we have already seen, a much more important part in producing their general effect; and a thorough knowledge of these forms accustoms the eye to refinements which

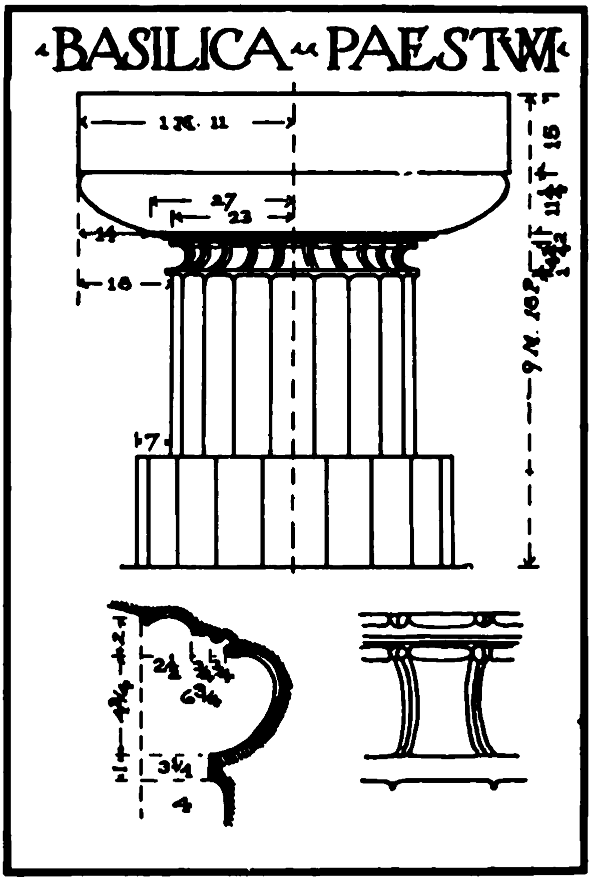


Fig. 10.

might otherwise not be apprehended. Especially is this so of the ancient Greek structures.

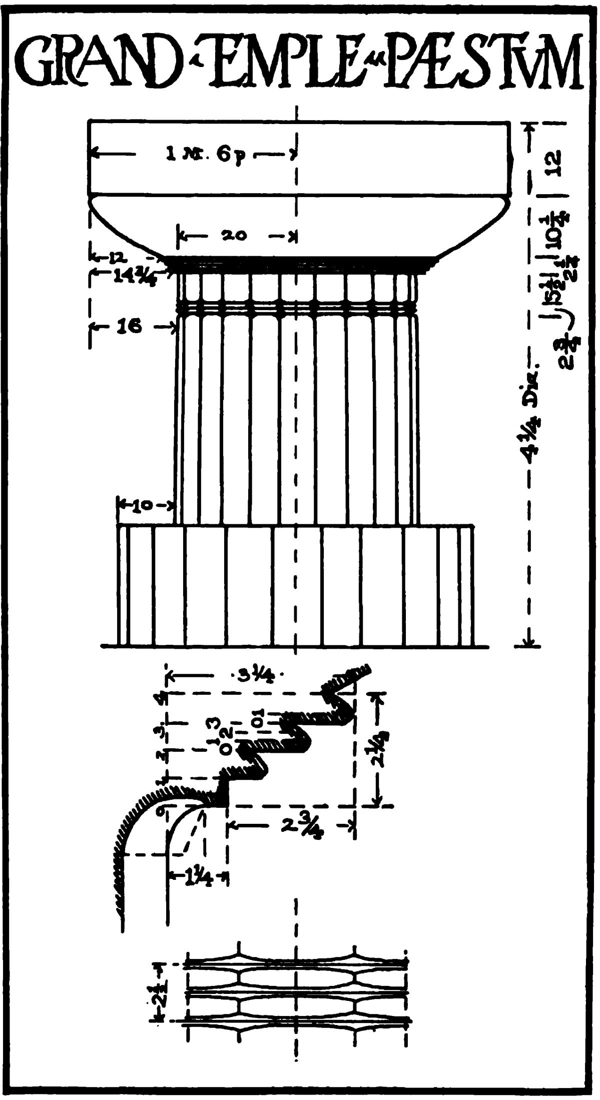


Fig. 41.

The Orders, as we have them to-day, are derived from the measurements of existing remains of Classic Greek and Roman monuments. Aside from purposes of actual reproduction and their whole or partial use on modern buildings, they are most valuable as ideal types from which the proportions of old and new work may be studied and estimated.

Modern practice and theory do not give to the Orders the importance which they have heretofore generally received. Yet these forms have come down to us with more authority than any other single units employed in architectural practice. To comprehend thoroughly the Orders, their purposes and adaptability to modern work, it is important to know the conditions under which they were first developed, so that

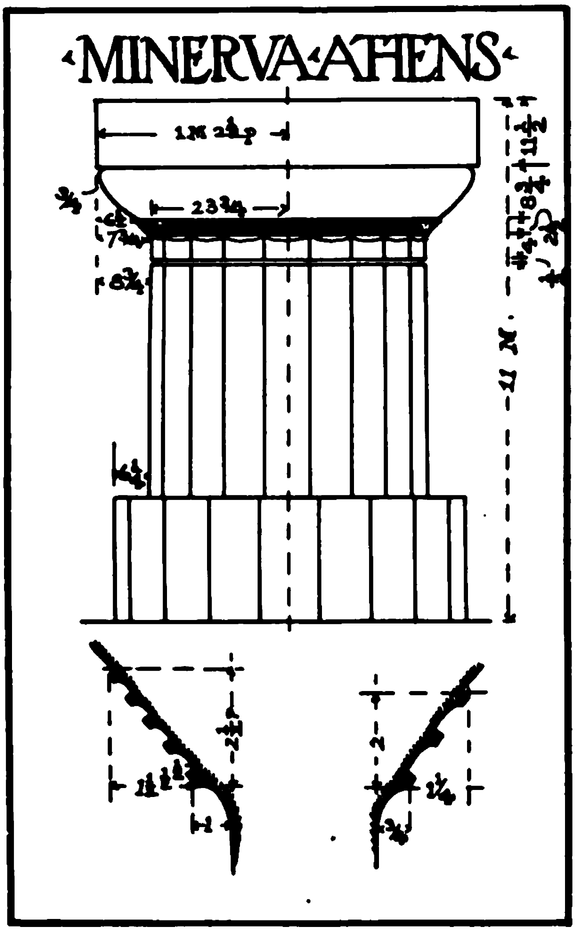


Fig. 42.

we must study their use in old and Classic work—where they were a much more important factor in the direct evolution of architecture than now in our climate, and under the social conditions of to-day. It is therefore necessary that the derivation and historical growth of

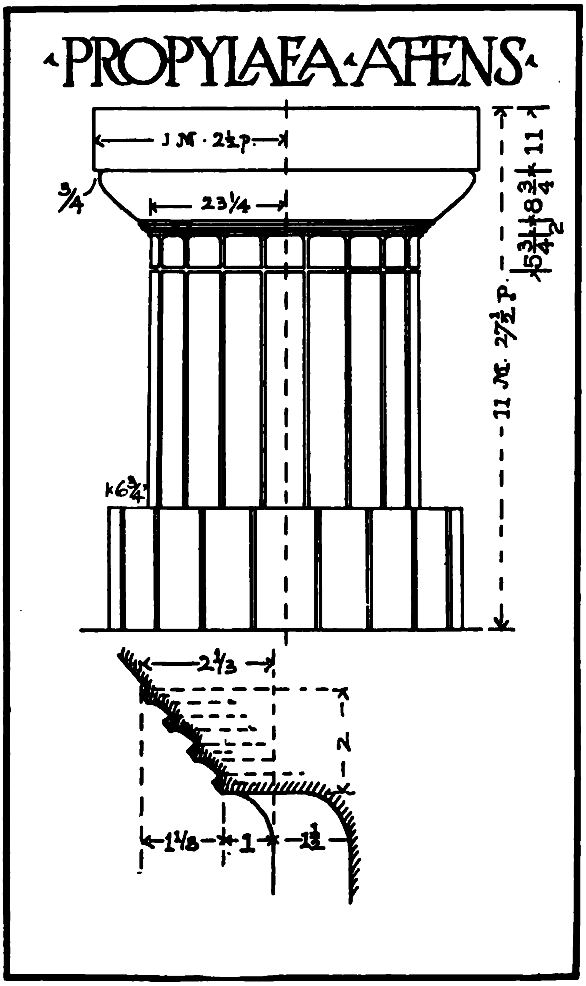


Fig. 43.

the Orders should be understood, and their use should not be attempted until their forms and proportions have been thoroughly studied. Then, when intelligently used, they may indeed become a vital and consistent part of our modern architecture and life.

In reproducing any of the Greek Orders the old examples should be followed as closely as possible, as their proportions have been so well defined by time and precedent that at this day these forms should be considered as definite. This stricture is emphasized by the fact that, since the Roman Orders were defined, the Greek style of architecture has been but little used, and no further developed; and in the few instances where it has been revived it was apparently recognized that any use of the details or parts of Greek architecture should be modeled as exactly as possible on the actual precedents furnished by old Greek work.

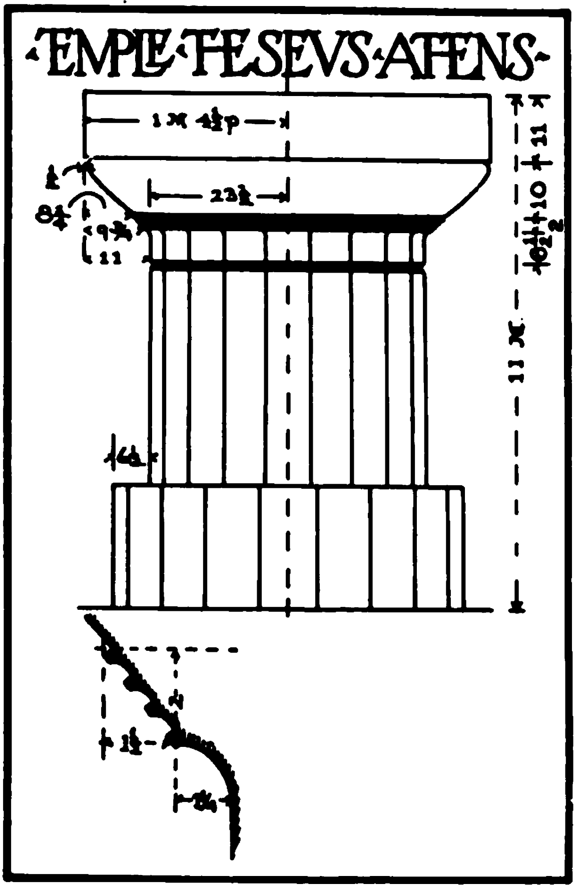
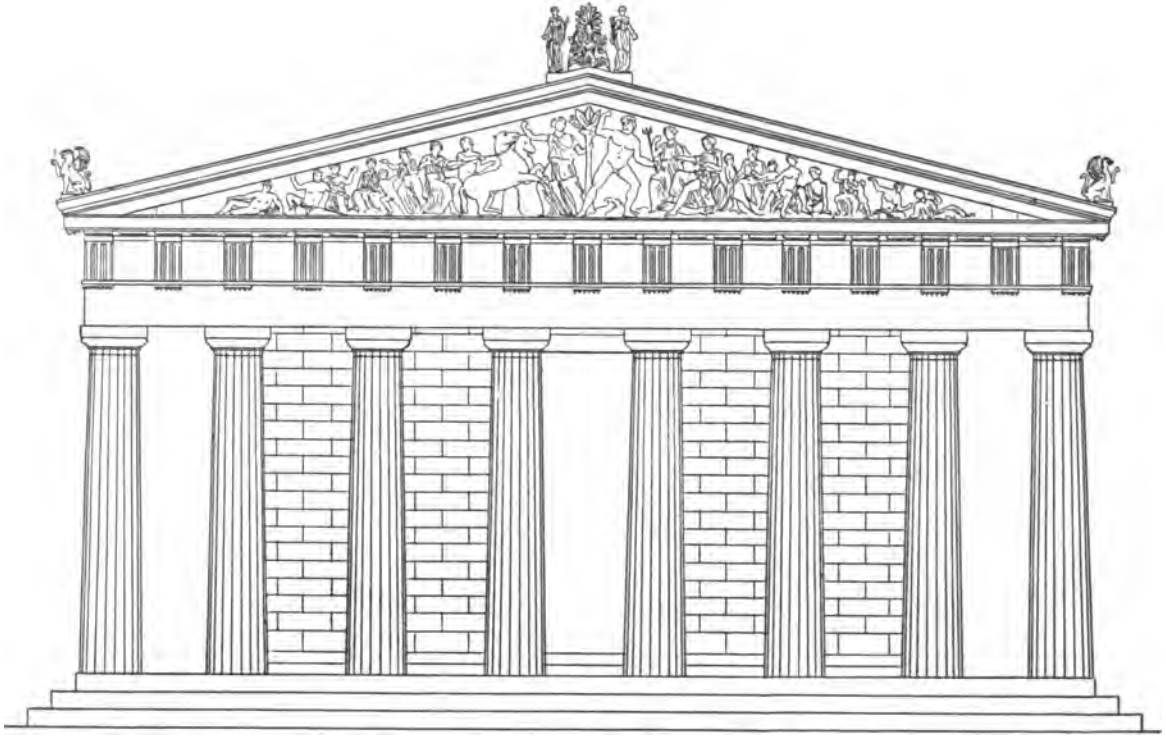


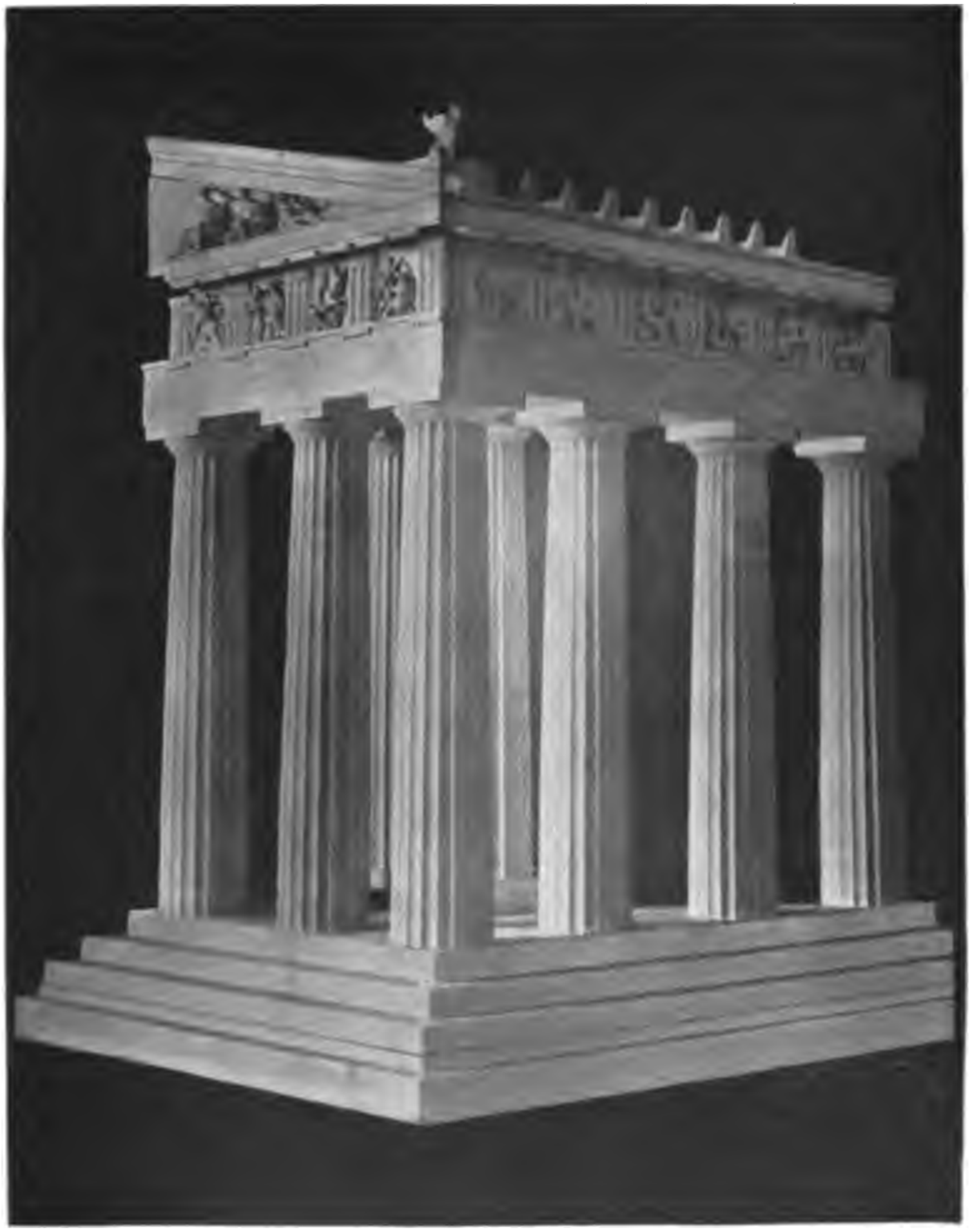
Fig. 44.



·THE ·PARTHENON·AT·ATHENS·

Fig. 45.

UNITED STATES PATENT OFFICE AT WASHINGTON, D. C.



Restored Model of Corner of Parthenon at Athens
Showing use of Greek Doric Order and the relation of its various parts

ANALYSIS OF THE GREEK ORDER.

The Greek "Order" is an architectural composition resulting from the combination of a platform or **Stylobate,** a **Column,** and an **Entablature.** A pedestal is not employed with the Greek column. The platform, or stylobate, consists of a plain mass of greater or lesser height, upon which the columns rest. In the Doric Order, however, the stylobate generally consists of three high steps upon which are set the columns. The entablature is divided into **Architrave** or **Epistyle, Frieze,** and **Cornice.**

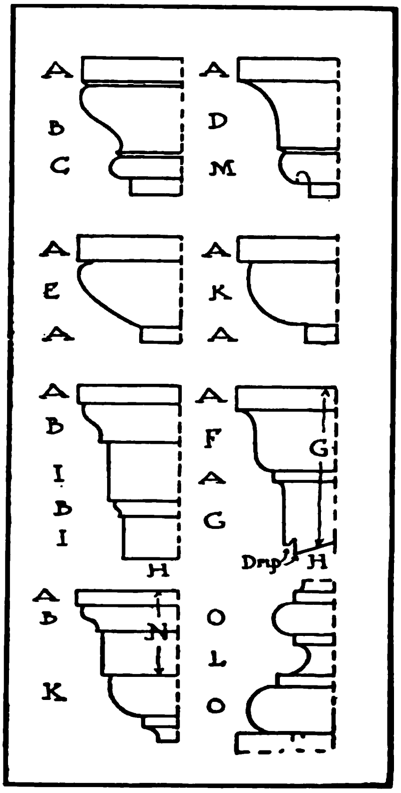


Fig. 46. Moulding Outlines.

There are three Greek orders:

(1) The **Doric Order,** in which the capital is composed solely of mouldings. (See Fig. 50.)

(2) The **Ionic Order,** in which the capital is composed of mouldings enriched with carving, and with the addition of long scrolls called **Volutes.**

(3) The **Corinthian Order,** in which the capital is composed of mouldings, volutes, and leafage.

The **Caryatid** and **Persic Orders,** in which the entablature is carried by sculptured figures instead of by columns, are not specified as separate orders, but should not be overlooked.

There are other distinguishing characteristics, but the capital is perhaps the most notable.

The column, so important a part of the order, is itself a growth of much earlier times. Its origin is doubtful and probably it developed variously in different places at nearly simultaneous periods.

Origin of the Entasis of the Column. The great difference between the width at neck and base of the Greek column in the early examples indicates in part its experimental stages and in part its derivation from the stone wall or pier; while its outline certainly suggests more the "batter" or slope of a pylon or wall than the entasis of a column. We shall find, in taking up the Greek Doric Orders more in detail, still other evidences pointing in the same direction.

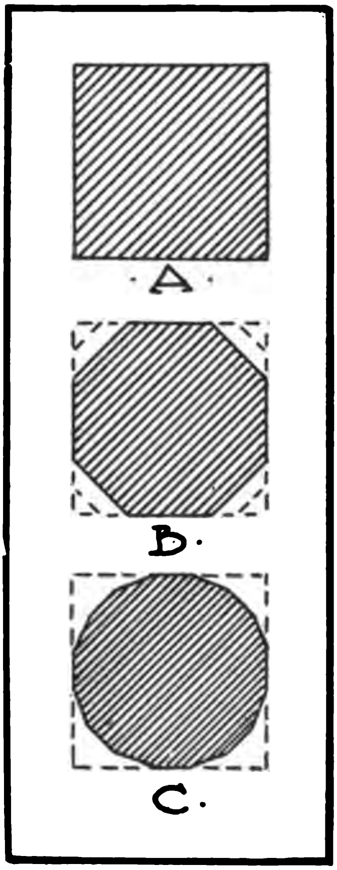


Fig. 47. Plans showing Development of Doric Columns.

The Flutings and their Origin. The shafts or columns are frequently divided into flutings. In the Doric Order these flutings are, in plan, short segments of a circle or of an ellipse, and intersect in a sharp, raised edge, or arris; but in the Ionic and the Corinthian Orders the flutings are almost half circles in plan, and are separated, not by a mere arris, but by a fillet or an appreciable portion of the shaft itself, as at F in Fig. 49.

In the earliest rock-cut temples, pylons or square piers (as shown at A, Fig. 47) were probably left to support the roof, as may be seen to-day in India and Central America. These piers were sometimes elaborately carved and decorated in panels on their four sides.

The fluting was probably first suggested by the undue amount of wear on the corner angle, and this angle was chamfered off, as at B in the same figure, first slightly and afterward so as to make the pier of eight equal faces or sides. These chamfers extended from a point above a person's head and near the top of the pier, down to the floor, as at A or B in Fig. 48. Later on the eight faces were made into sixteen by the same simple process of dressing down the corners (C,

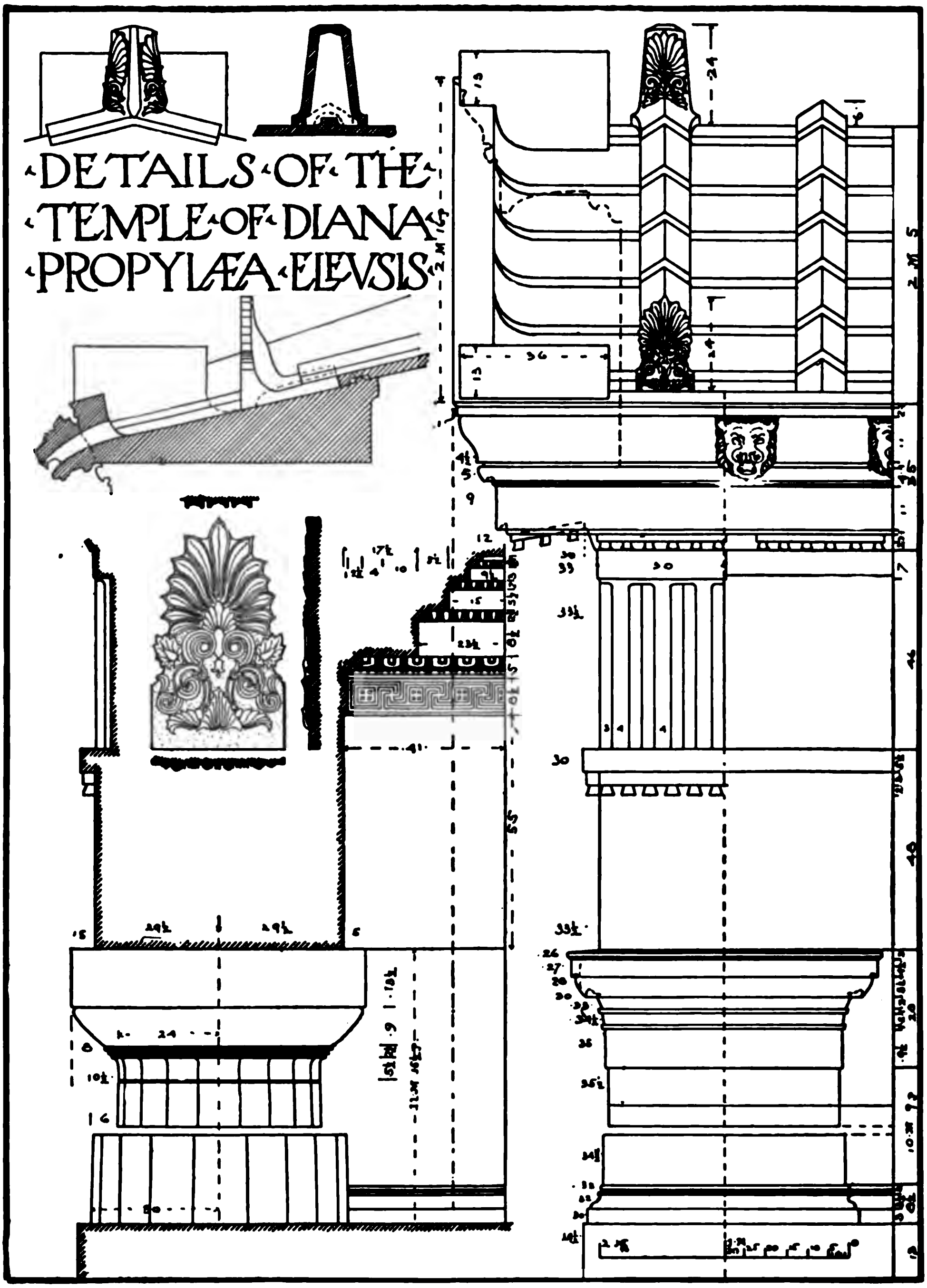


PLATE XXXVI.

(A reproduction at small size of Portfolio Plate XXXVI.)

Fig. 47); and the top of the pier was perhaps left square (C, Fig. 48), as the earlier form suggested.

But it was now found that the angles of the corners were so obtuse that they were hardly distinguishable (A, Fig. 49); and it was an easy further step to sharpen and emphasize these corners by hollowing out the flat surface, at first very slightly (B, Fig. 49).

It must be remembered that this is the development of a rock or stone-cut pier that we are tracing, and that the instinct of the artisan was to preserve the distinctive feature, that of the angle or corner, disregarding at first an easier solution—that of making it circular in plan. We find instances of just this stage of development in some of the rock-cut tombs at Beni-Hassan in Egypt, where two columns of a form similar to that just described were used *in antis* (Fig. 31).

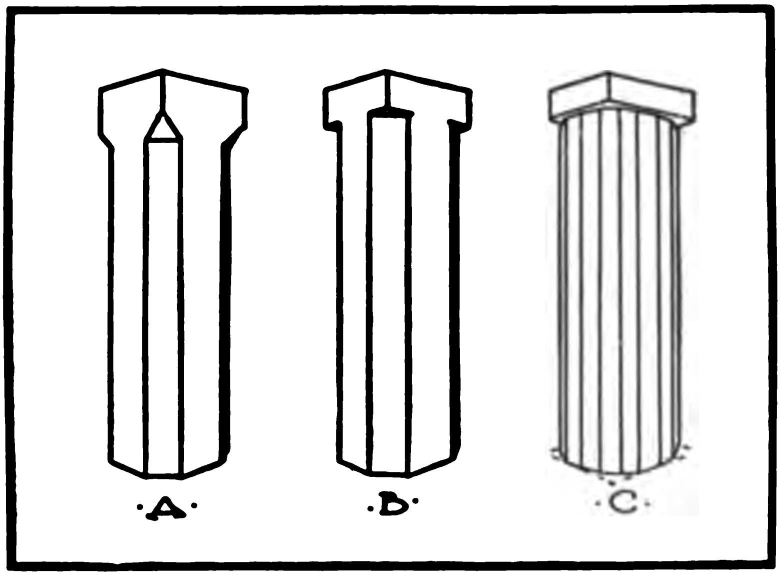


Fig. 48. Elevations Showing Development of Doric Columns.

The process of chamfering off the corner angles would leave us with a pier of sixteen sides, while the Greeks adopted the number of twenty for the Doric work of the best periods. This was undoubtedly after due experimentation, when it was found that sixteen flutes were too coarse for the best effect. At Pæstum we find evidences of this process. There, in the Great Temple, the exterior

Order of very large columns has twenty-four flutes. The interior lower Order has twenty, and the upper Order sixteen flutes, evidently proportioned with regard to the size and girth of the whole of the column quite as much as to their distance from the eye.

In some such way as this was developed the character of the fluting and capital of the Greek Doric column. By referring to Fig. 48 again, it will be found that the outline of the pier shown at A suggests more the outline of the capital formed of an echinus and abacus, as in the later examples, than do the next successive stages, B and C.

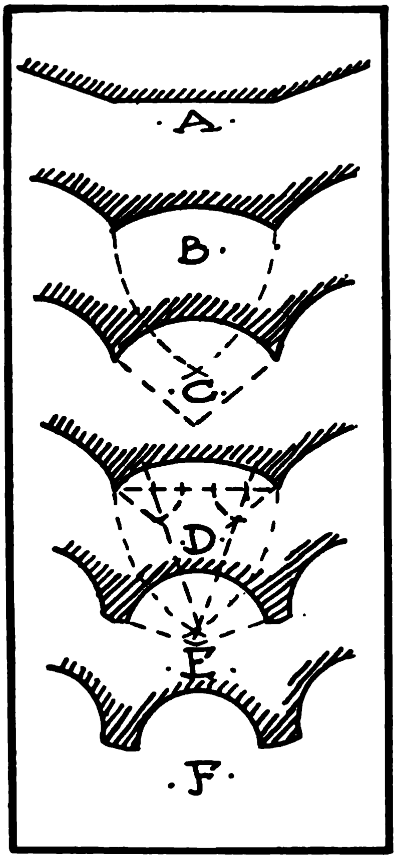
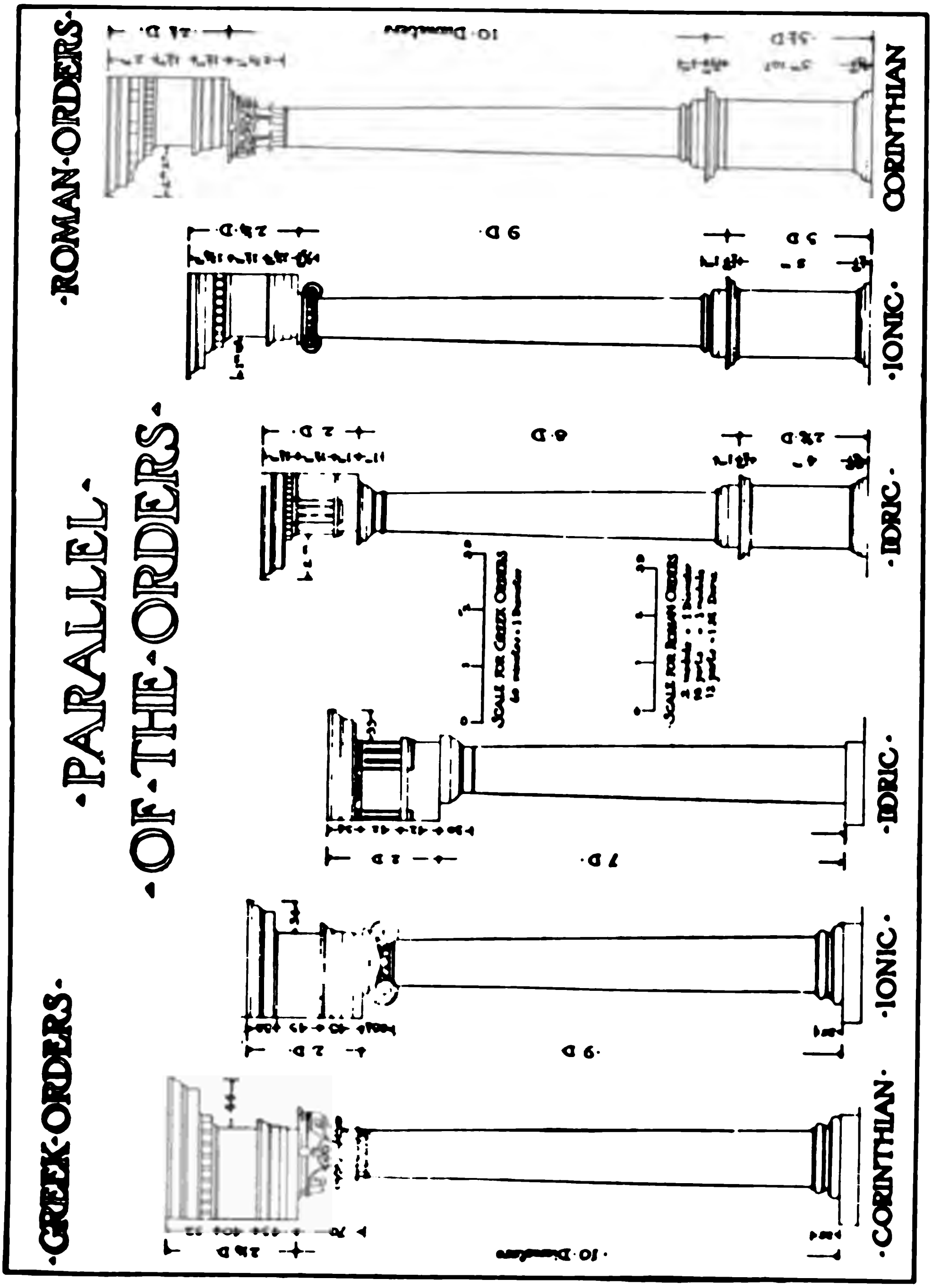


Fig. 49. Development of Column Fluting.

The further growth of the fluting is shown in Fig. 49. At C is indicated a section of greater depth and decision. In D we find that three circles are employed to get the effect, one of large radius for the flat center sweep, and at either end one of short radius, in order to obtain a sharp corner edge, or arris, at the meeting of the flutings. This presages the appearance of the fillet separating the flutings, although this character is afterwards relegated to the second Order, the Ionic.

The presumption is that the flutes were finished in place at the time the building was constructed. There are certain buildings which seems to prove this theory, such as the Temple of Apollo at Delos, where the channels are begun at the top and the bottom of the shaft and left unfinished.

Monoliths are rare in Greek architecture, and the cylinder or


·PARALLEL·
·OF·THE·ORDERS·
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CORINTHIAN
·10·Diameters
9 D·
7 D·
8 D
9 D
10·Diameters
Scale for Greek Orders
Scale for Roman Orders

Fig. 50.

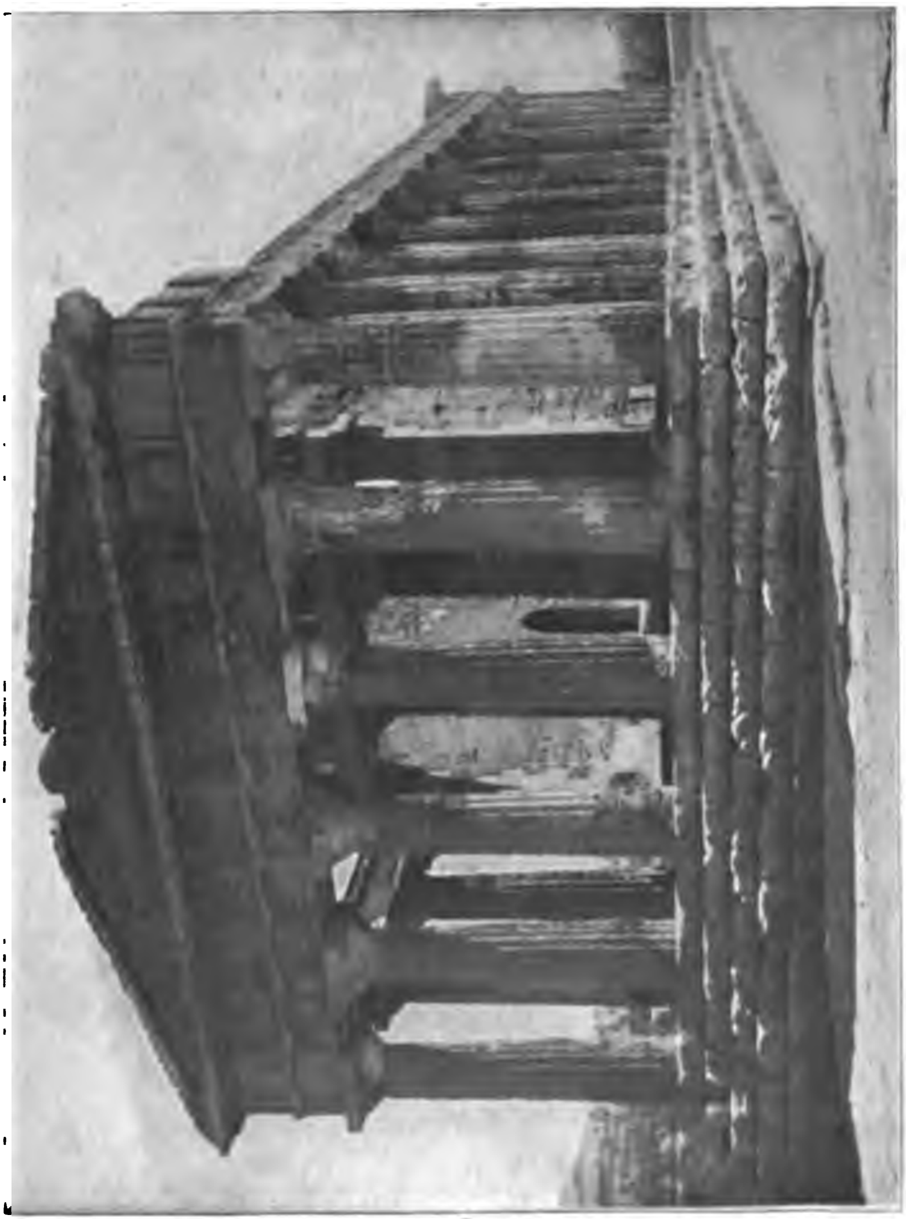
shaft of the column is generally formed of a series of courses or drums, placed one above the other.

The flutings of the Ionic and Corinthian Orders are generally twenty-four in number; each flute is separated by a small fillet, about one-third, or less, the width of the flute itself, which is practically a semicircle in section (F, Fig. 49). The shallow Doric flutings with sharp points or arrises between them, radically different from these semicircular flutings, should be considered as a distinctive feature of the Greek Doric column. They are invariably used in modern practice on any fluted example of this Order, although the Ionic system of fluting may sometimes be rightly used with the Roman Doric Order.

Comparison of Greek and Roman Orders. Reference to the cut entitled "Parallel of the Orders" (Fig. 50) will give more plainly the general proportions of the Greek Orders, and show something of the difference between the Greek and Roman examples in the use of the Doric, Ionic, and Corinthian columns. It may be understood that all the plates given as "Orders," when not specifically named, are intended as representative examples of each Order, of which in reality there may be many widely different existing remains. In Fig. 50, the types of Greek Orders of architecture are as taken from Asher Benjamin; and the Roman Orders are those as given by Vignola. It is readily seen from this figure that the so-called Roman Doric, Ionic, and Corinthian columns were derived from the earlier Greek forms, and that the Roman variety of each style is a comparatively direct growth from the original, even though it varies from it in many essentials.

System of Measurement for the "Order." It is necessary, in order to arrive at a proper comparison of the Order, to adopt a general **Unit of Measurement,** which will be the **Diameter** of the column at the base, this diameter, in the Greek Orders, being divided into sixty parts, called **Minutes,** which are as often used to form two **Modules** of 30 **Parts** each. The term "diameter" when used as a unit of measurement, always refers to the diameter *through the bottom of the column* or *shaft* directly above the mouldings at the base.

The diameter of the Roman column is divided into two modules as a unit of measurement. The Roman module is subdivided into twelve parts for the Doric Order, and eighteen parts for the Ionic and Corinthian Orders. Thus each module is equal to one-half a diameter;



Temple of Concord, Girgenti, Sicily.
Showing early example of use of Greek Doric Order.

and two modules in the Roman Order is the same unit as the diameter of sixty minutes in the Greek.

At the right of the Roman and at the left of the Greek Orders on Fig. 50, are shown lines marked for divisions in height, these divisions being multiples of the diameters at the base of the columns. The three Roman Orders given are all of the same diameter; and the three Greek columns, while larger at the base than the Roman examples, are also each of the same diameter. This plate, accordingly, indicates the comparative height, to one another, of each of the three Orders. In the Greek Orders, it will be noticed that the pedestal is omitted as consistently as it is included in the Roman examples. After briefly describing the three type-examples of the Greek Orders shown in this plate, they will each be examined and illustrated more particularly.

It will be noticed that the Doric Order is by far the heaviest in both sets of examples. The height of the Doric columns is seven diameters. Its cap, above the upper line of necking, is thirty minutes, or one-half a diameter. The height of the entablature is two diameters, the architrave being forty-two minutes and the cornice thirty-six minutes in height. In the Greek Doric, the architrave and frieze are each about three-fourths the diameter in height, the whole entablature being therefore about two diameters high.

The Greek Ionic column is nine diameters in height, with a base twenty-five minutes and capital twenty-eight and one-half minutes high. The entablature is two diameters high, consisting of an architrave of forty-five minutes, frieze of forty-three minutes, and cornice thirty-two minutes in height.

The Greek Corinthian column is ten diameters in height, the base twenty-five and the cap seventy minutes high; the entablature is two and one-fourth diameters high, with an architrave of forty-three minutes, the frieze of forty minutes, and the cornice of fifty-two minutes in height.

The projection of the cornices varies, in the Doric being thirty-three minutes, in the Ionic thirty-four minutes, and in the Corinthian forty-four minutes.

THE DORIC ORDER.

We find in Egypt, at the catacombs of Beni-Hassan, the rough, primitive type of the Doric Order; and it may be from here that the

Greeks received their inspiration. It is sufficient to compare the design of the column at Beni-Hassan, which we may call pro-Doric (Fig.31), with a primitive form of the Greek Doric column—one taken from the Temple of Corinth, (Fig. 39) for example—in order to make plain the reasons for this allegation. It is true that, even if the Greeks borrowed the idea of the Doric Order from the Egyptians, they transformed it by the changes they made until it was glorified into a type almost absolutely original.

The oldest and heaviest of the three Greek Orders was the Doric, which was also, so far as the column itself was concerned, the simplest of them all. It combines at the same time solidity and strength with what proved to be the most subtle and delicate refinements of outline that architecture has known. This Order may be considered as representing, *par excellence,* the best efforts of the Greek builders. It is certainly representative of the most perfect expression of the Greek spirit, which we find is exemplified even by the curve of the echinus used in the capital of this Order.

The Grecian Doric Order, so far as the column is concerned, was beautifully simple, and, as used by the Classic builders, attained a great effect of grandeur and dignity. This is well shown in the Temple of Theseus, the most complete remains of a Greek Doric temple, which is shown in the illustration (Fig. 51). As we have seen was natural from its derivation, no base was used with this column. The thickness of its shaft in comparison with its height, along with the necessary narrow spacing of the columns, did not seem to require any such feature.

Differences in the Examples of the Doric Order. The great differences which we find in the general proportions and parts of the existing examples of the Doric Order, plainly show the experiments of the Greek artists in their endeavor to arrive at an ideal, or even a satisfactory, type form. Thus we find that the height of the column itself varies from about four and one-half diameters to seven diameters, while the diameter at the top of the shaft varies from six-tenths to eight and one-quarter tenths of the diameter at the base. In general, we find that in the earlier examples the columns are much thicker in proportion to their height, and that there was also much more difference between the diameter at the base and at the neck than exists in those of a later date.

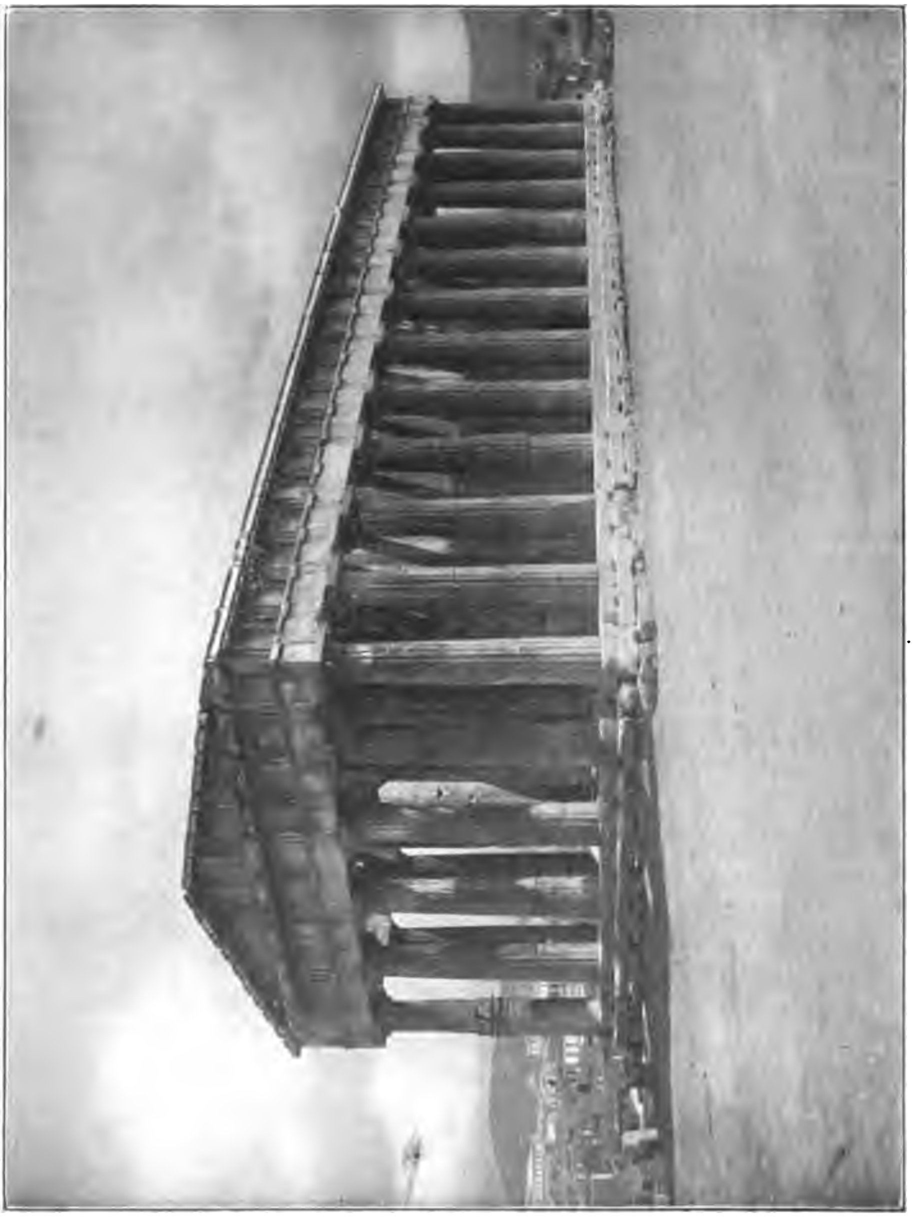


Fig. 51. Temple of Theseus, Athens.

Order of the Parthenon. The Order of the Parthenon at Athens (Fig. 45, and Plate XXXVII) is held to be the most beautiful example of the Doric Order. The columns, without a base, rest immediately upon a stylobate consisting of three high steps of Pentelic marble. The shaft, slightly swelling, has twenty shallow flutings, narrowing gradually from bottom to top, as does the column itself, and separated by sharp edges, or arrises. The column, too, is most perfect in diameter relation to height.

In the Parthenon the columns are five and a-half diameters, or eleven modules, in height. These proportions are also those of the columns of the Temple of Theseus and the Doric columns in the Propylæa or entrance to the Acropolis at Athens; but not all the examples of the Greek Doric present columns of the same proportions.

Gradual Changes in the Proportions of the Doric Order. We find that, beginning with the seventh century B. C., when the column shaft was still clumsy and uncouth, the proportions afterwards grow gradually more elegant; and, at the same time that the columns tend towards a form more slender, the entablature grows less heavy.

Among the temple buildings, the most ancient are also the crudest. The height of the entablature is then about two-fifths that of the column. Afterwards, as in the Temple of Athena on the island of Ægina, the Propylæa, the Temple of Theseus, and the Parthenon, the entablatures are about one-third the height of the column; while in the Temple of Zeus at Nemea, which belongs to the commencement of the decadence, the entablature height is only a quarter of the column height.

Column Entasis. In these Orders, the upper diameter is made quite considerably less than the lower diameter, and the column is "tapered" or "swelled" in outline. It thus represents an inclined profile with an outline tapering or swelling from the lower to the upper diameter. This profile is generally given a form slightly curved, due to an "entasis" of the middle part, but sometimes the two diameters are joined by a straight line. The smaller and larger diameters, although variable, have a certain relation that is followed in every case, changing the outline of the column and rendering it more or less curved.

In the old Temple of Corinth, the diminution of the upper part equals one-fourth a diameter; in the Temple of Poseidon at Pæstum, it is one-third; in the Temple of Theseus, the Parthenon, and the

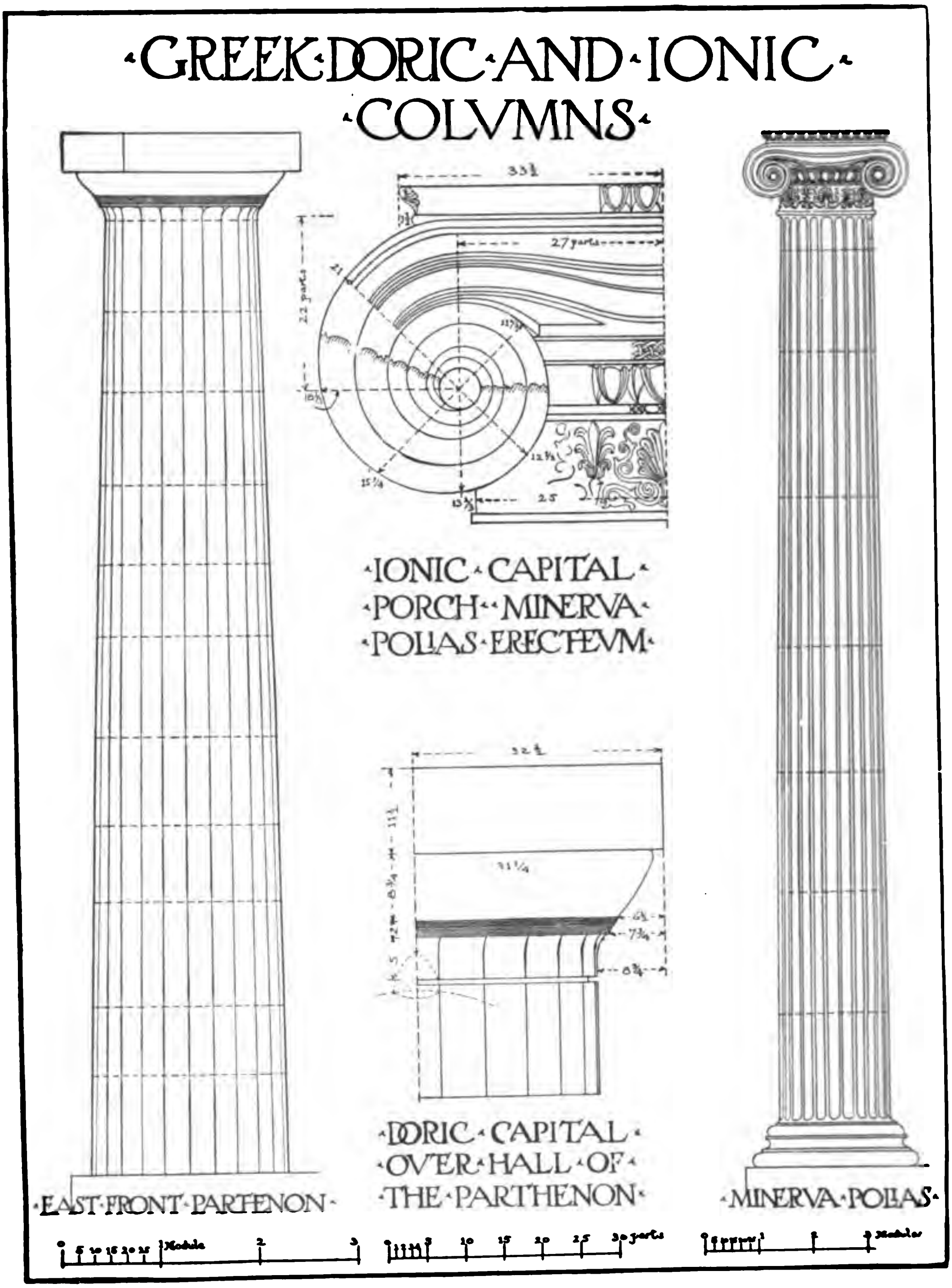
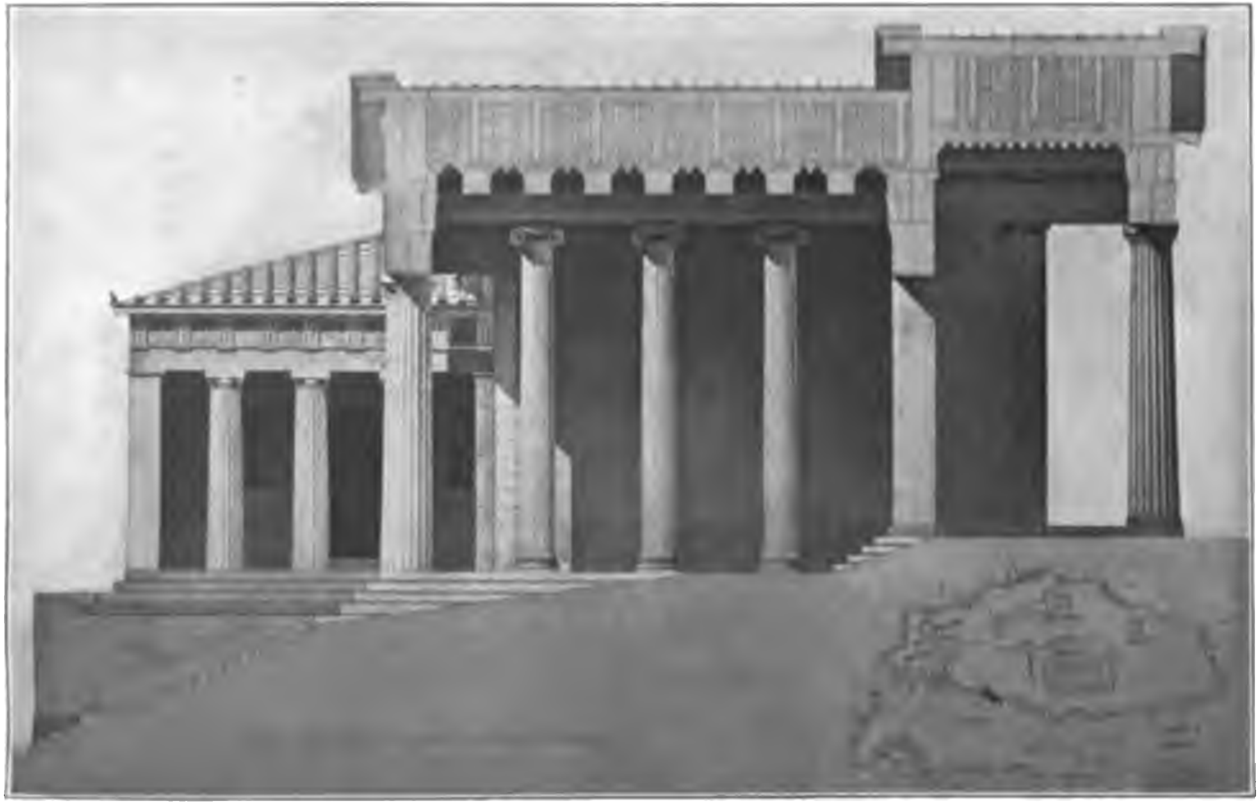

GREEK DORIC AND IONIC COLVMNS
IONIC CAPITAL PORCH MINERVA POLIAS ERECTEVM
DORIC CAPITAL OVER HALL OF THE PARTHENON
EAST FRONT PARTENON
MINERVA POLIAS
33½
27 parts
22 parts
21
10½
11⅞
12¾
15¼
13⅓
25
32½
31¼
11½
8¾
6½
7¾
8¾
0 5 10 15 20 25 1 Module 2 3
0 5 10 15 20 25 30 parts
0 1 2 3 Modules

PLATE XXXVII.

(A reproduction at small size of Portfolio Plate XXXVII.)



Sectional View through the Propylæa, the Ornamented Approach to the Parthenon, at Athens
Showing Greek Doric and Ionic columns of the Fifth Century B. C.—Restored by E. Ulmann

Temple of Zeus, two-ninths; in the Temple of Zeus at Nemea, one-fifth; and in the Portico of Philip one-sixth.

To trace the growth and gradual refinement of the proportions of the first Greek Order, it is helpful to have an idea of the comparative date and column dimensions of the best known examples; and for this purpose it becomes necessary to revert to the unit of the measure—the diameter of the columns at the base.

DATES AND COLUMN DIMENSIONS OF GREEK DORIC TEMPLES.

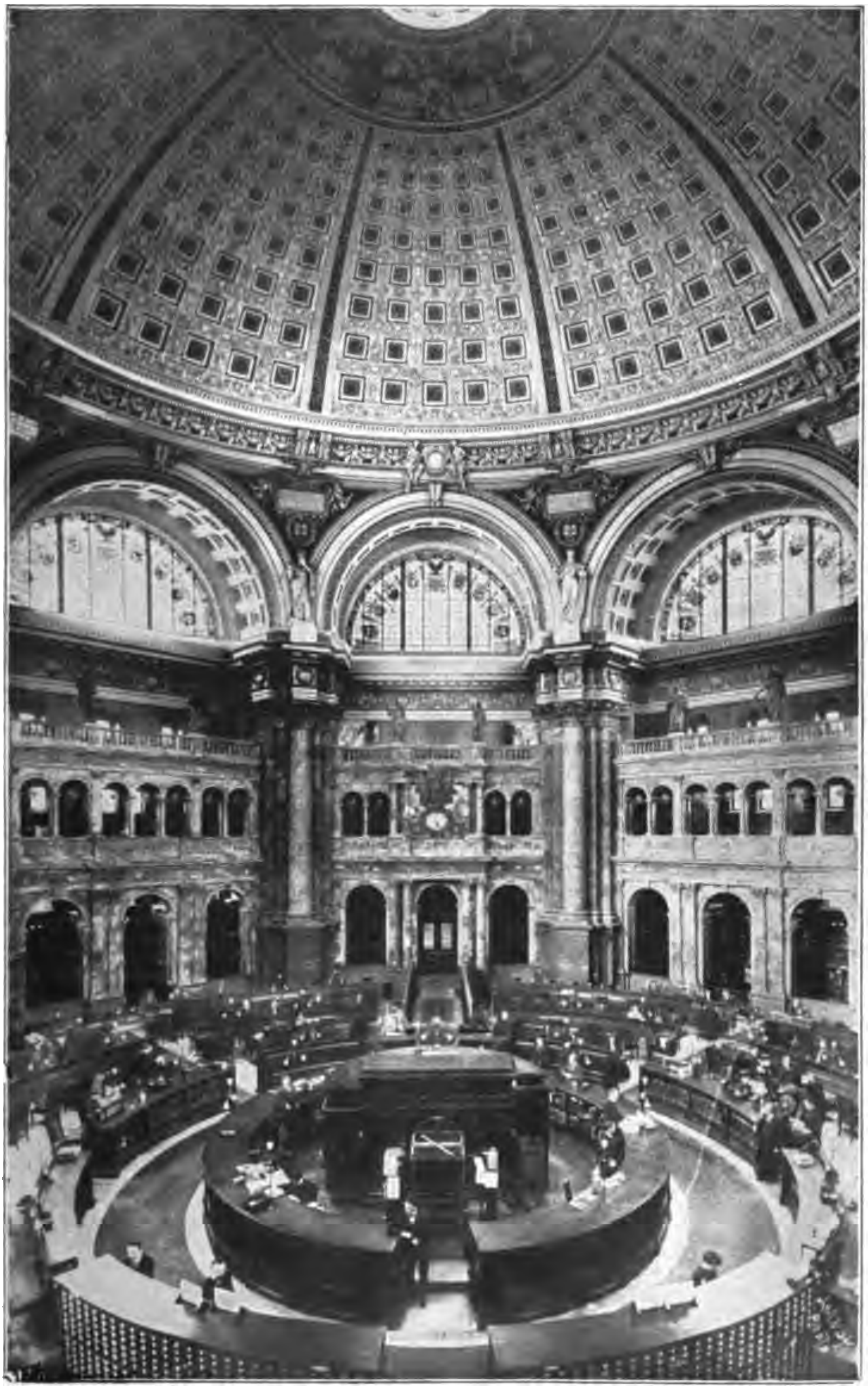
DATE	TEMPLE	COLUMN DIMENSIONS
7th century B. C.	Old Temple of Corinth	Column not quite 4 diameters in height
End of the 7th century	Old Temple of Selinus	Column 4½ diameters
6th century	The most recent Temple at Selinus	Column 4½ diameters
6th century	Temple of Zeus, Selinus	Column 4⅔ diameters
6th century	Temple of Artemis, Syracuse	Column 4⅜ diameters
6th century	Temple of St. Mary of the Column, Syracuse	Column a little less than 5 diameters.
6th century	Grand Temple of Poseidon, Pæstum	Column 4½ diameters
6th century	Temple of Demeter, Pæstum	Column 4¼ diameters
6th century	Temple of Zeus, Olympus	Column 4⅜ diameters
5th century	Temple of Athena, Ægina	Column 5⅓ diameters
5th century	Temple of Theseus, Athens	Column 5½ diameters
5th century	The Propylæa, Athens	Column 5½ diameters
5th century	The Parthenon, Athens	Column 5½ diameters

Evidently the builders recognized that the effect produced by these first columns was stumpy and ungraceful. They found that they were too short for their height, that the diameter at the neck was much too small in proportion to that at the base, and that the first used mouldings were uncouth; and these faults they apparently set themselves to rectify in succeeding examples. So far as we can trace the dates of the Greek temple ruins—allowing, of course, for the difference in locality, which must sometimes have prevented the study, by the builders, of examples in another country—the proportions of the Doric Order show a continuous progress toward the perfection to which it finally attained in the Golden or Periclean Age, the fifth century before Christ.

Theory of Derivation of Doric Order from Wooden Construction. The details of the Doric Order, and especially of the entablature, are supposed to have been borrowed from the timber framing of the

LIBRARY OF CONGRESS, WASHINGTON, D. C.

The Library Building is a Hollow Square with Dome in the Center, and Bookstacks and Entrance Hall Radiating from Center to Sides



MAIN READING ROOM, U. S. CONGRESSIONAL LIBRARY, WASHINGTON, D. C.
In Center of Central Circular Desk, is the Housing for the Book-Handling Machinery. Card Catalogue in Foreground. View Facing Entrance. The Corinthian Order has been Used.

smaller and earlier buildings of the Greeks, and therefore to be a copy, in stone, of the forms and parts of a wooden building.

It was the theory of Vitruvius, the principal ancient writer upon architecture, that the gradual substitution of stone for wood as a building material would naturally account for certain elements in which wood construction in the Doric Order seems to be imitated in stone. He says that stone columns took the place of wooden posts, and the fluting of these columns corresponded to the chamfers of the posts. The stylobate, plinth, and base, he derives from a sill or beam on which the posts rested. The capital is merely a plate or block, intended to shorten the span of the joists resting upon the posts, and to give the joists a broader bearing upon the points of their support. The triglyphs correspond to the ends of the crossing beams, and the void spaces between these beams are the metopes, which were at first left open for light and ventilation and which were filled in with decorated slabs only at a later period. The rafters of the roof projecting beyond

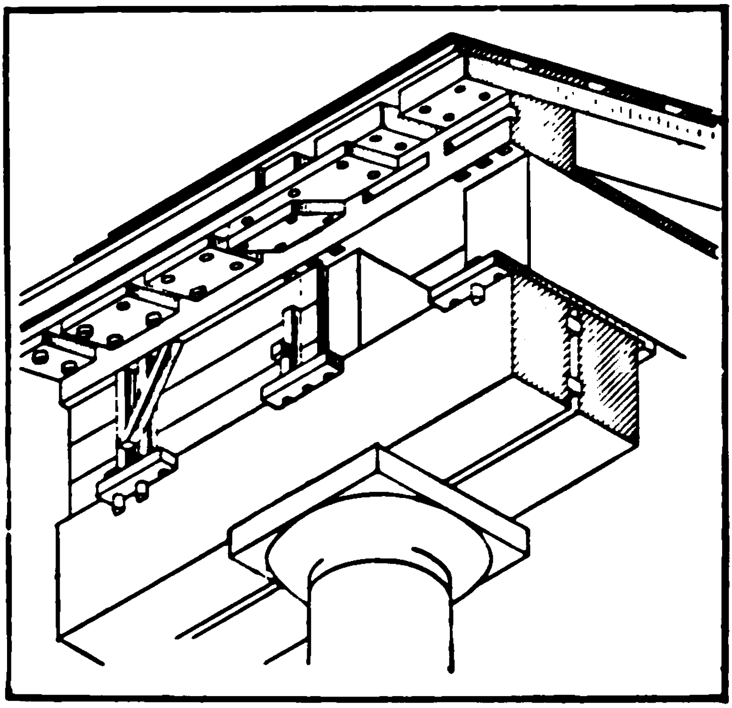


Fig. [illegible]. Wood construction.

the frame of the building gave the suggestion for a cornice, and the mutules of the corona are the ends of these rafters.

The guttæ or drops have the shape of pins used in the framing of timber, while the slope of the roof itself gives the outline of the pediment. These suppositions are not beyond criticism and can indeed be met by valid objections, but they are at least plausible and interesting, taken altogether.

Belittling, in a way, as this explanation seems, it appears to have had general acceptance up to the present time, and has been at least ingeniously supported by many theorists to whom it has appealed. The two cuts, Figs. 52 and 53, indicate the possible parallels in wood and stone whereby this growth may have occurred. In any case we must allow that the stone version is not a mere copy of the original, but that it has become very highly idealized in most of its parts. The triglyphs and metopes represent what *may* have been the ends of beams and the spaces between them; and the mutules—sloping as they are in most of the Greek examples—*may* represent the ends of rafters. Referring particularly to Fig. 52, and imagining that the column below is done away with, and that the architrave is merely the upper portion of a blank stone wall, as is shown in C, Fig. 54, we shall try to find another and more logical reason for the treatment of the frieze above it, than that one generally allowed.

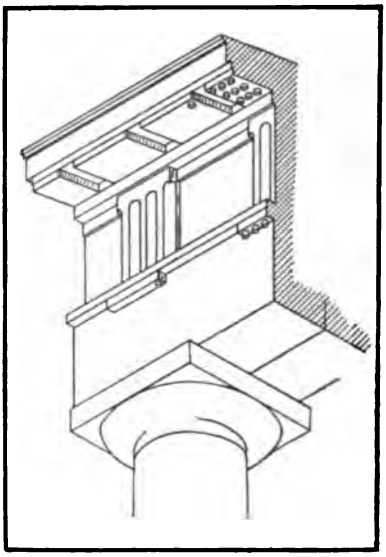


Fig. 53. Stone Construction.

Another Explanation of Origin of Doric Entablature. First, we must remember that the wall below is of stone, and that it is unbroken by openings (as at 1 C, Fig. 54). It has no windows, as they would be too much exposed to the inclemencies of the weather. Across the top of this stone wall is placed a continuous band of coping (2 C), to protect its upper surface; and upon this are set a number of short.

square upright posts or blocks (3 C), leaving openings between them for the admission of light and air. The beams and rafters of the roof are set immediately upon these square blocks (4 C), and the eaves of the roof overhang the wall so as to protect both it and the windows. The rafters or mutules (4 C), of course, would naturally come directly over the blocks or triglyphs (3 C), which are set on the coping or tænia (2 C); and when the porch of the temple or building is reached, the same treatment is continued; only here the lintel laid across the columns becomes the architrave instead of the upper part of a plain wall.

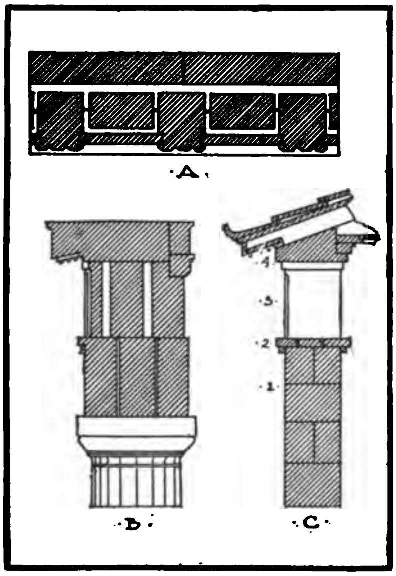


Fig. 54. Sections showing Early Wood and Actual Stone Construction of Parthenon.

This process of development is further supported by several bits of internal evidence. It will be found that the face of the Greek triglyph was set *flush* or *in plane* with the face of the wall or architrave below, while the face of the metope was set back from this surface in order to demark distinctly the corners and treatment of the triglyph. The fact above does something to support the assumption that the triglyph was not an ornament applied upon the face of the frieze, but was rather an important structural member in the support of the cornice and roof overhead. This receives even more striking corroboration in the method of constructing these stone entablatures. By referring again to Fig. 54, the section through the entablature at B, and the plan through the frieze in the entablature at A, are both taken from the Parthenon—a late example, as we have seen—and these two drawings reveal at once the fact that the triglyph itself is the most important structural block in the entire frieze. The space between, or otherwise the metope, is filled at the front by a shallow panel of marble set in between the triglyphs, and the space behind it is filled with another stone which does not exercise any direct significance upon the construction of the entablature.

Again, it must be remembered that the triglyphs come directly over the columns beneath; and this fact, along with the use of the triglyphs on the exact corner or angle in Greek work—where support for the work overhead on both sides of the building is most essential—is explained only by this method of reasoning. Of course, it would be most natural for the rafters of the roof to be spaced directly over these supporting blocks; and again—as occurs in the frieze below, where one triglyph, at least, comes over the space between the columns—one rafter comes in the space between the triglyphs; and so we have the elements necessary to produce the characteristic treatment of the Greek Doric entablature.

One other point should be mentioned. The carving that frequently ornaments the face of the metope in many of the Greek temples indicates by its character another reason in support of this theory. This carving was most frequently in the nature of trophies or decorative groups composed of various arms and pieces of body armor; and it seems very probable that this style of ornament originated from the fact that in earlier buildings this open space between the triglyphs was often filled with votive offerings of arms taken from captives and placed around the temple in this fashion. So, when this space was closed in in later work, the decoration of its face by a presentment of the trophy itself would seem very natural to the builders.

As the temples increased in size, they became more difficult to light from these small openings beneath the cornice, and it became necessary to open a large space in the roof for this purpose. It must have been about this time that the metope space began to be encumbered with trophies of armor, and soon thereafter it was closed entirely by blocks of marble, until its ancient purpose was entirely given up and disregarded.

Stone Character of Greek Buildings with Doric Order. Whichever of these theories be the more nearly correct, there can be no question as to the merit of the Grecian architecture of the latter part of the 7th century B. C. The builders of that day broke completely with the traditions of timber construction with which they were familiar and whose slightness they might have been tempted to imitate, whereas they established with real force and complete reasonableness the essential principles of a new mode of building.

From this standpoint the monumental works of Doric architecture that arose at the end of the 7th century and at the beginning of the 6th in Corinth, Agrigentum, Syracuse, Segesta, and Pæstum, are beyond criticism. By the 5th century, the proportions have been modified, and practiced hands and eyes have given to them greater elegance of detail and more refinement in the mass; but the new system of construction remains unchanged.

Thus was formed in the Greek Doric Order the first development of its kind, and one that proved to be the progenitor of the other succeeding Orders, as well as the very beginning of architecture as a fine art.

Afterwards, in parts of Macedonia and at Pompeii, the proportions of the Doric Order are accentuated in their height; it loses the robust aspect and strength of its character; and soon, in other aspects than the slimness of the column shaft, the decadence, which has commenced, becomes more manifest.

Type Form of Greek Doric Order. Plate XXXVIII displays a type form of the Greek Doric Order, the scale of parts being shown at the lower part of the plate, and the size of the column, in width, as parts at the base. The column is cut below the capital and above the base, so as to get both entablature and base on the page at a large size. At the right of the plate, a section through the entablature is shown by a darker section line, to indicate how the surfaces project beyond each other. This section is the outline that would be obtained if the cornice were cut through; or it may be considered as the pattern of the sides of the stones of which the Order is composed. Beside the capital of the column is the plan of the underside or soffit of the overhanging cornice, showing the ornamentation frequently used at the corner angle and the little circular guttæ which are shown in their location on the main elevation of the Order. At the left of the cap is another drawing of the outline of the capital at a larger scale.

In the example of the Greek Doric Order shown in Plate XXXVIII, the column has twenty channels or flutes, as shown in plan in Fig. 55, and rests upon a stylobate or platform generally consisting of three high steps. By referring to Fig. 88, an elevation of the Propylæa at Athens, through which entrance was obtained to the Acropolis above, the general appearance and use of this Order will be seen quite clearly. One invariable characteristic of this column, which in part

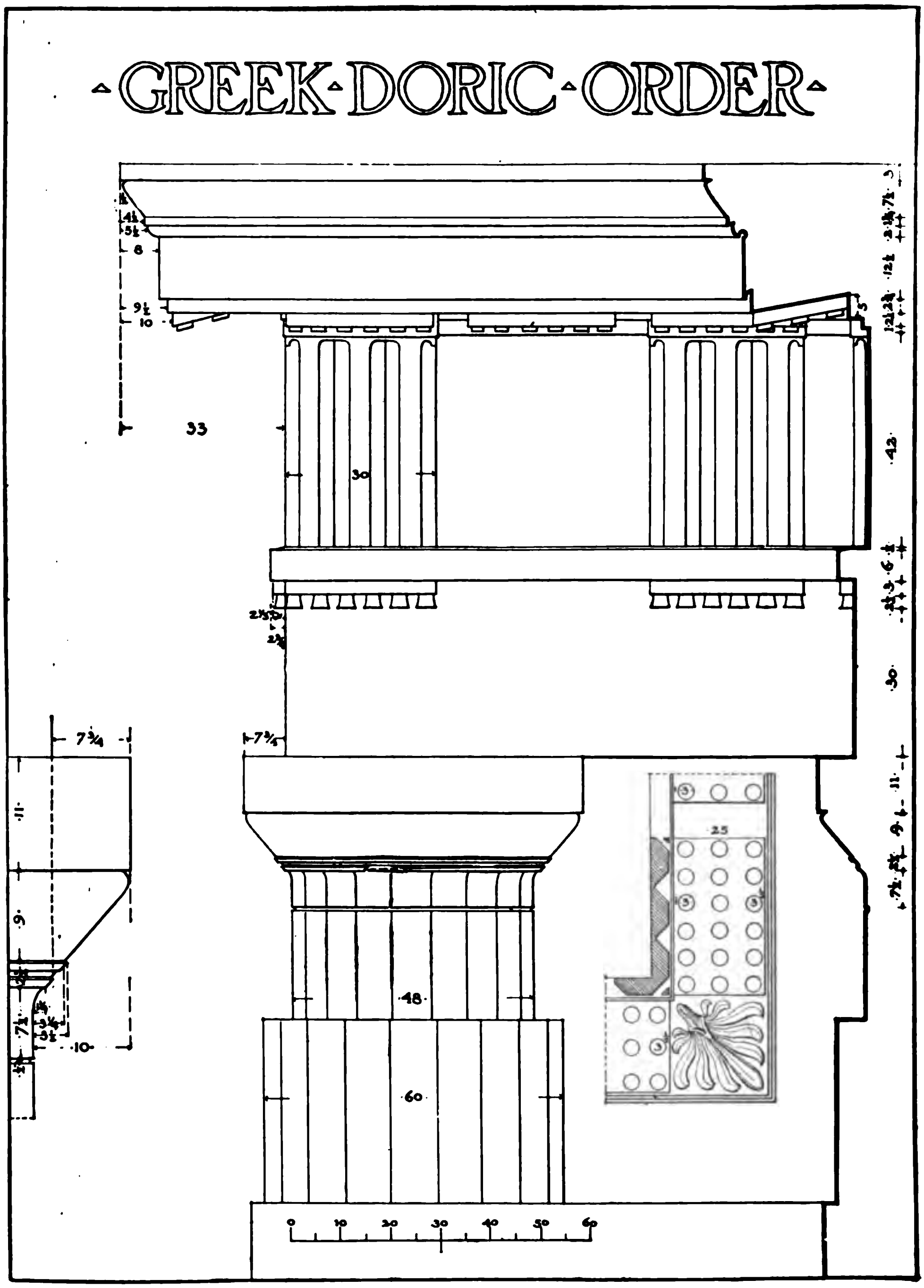


PLATE XXXVIII.

(A reproduction at small size of Portfolio Plate XXXVIII.)

indicates its more elementary form as well as its direct derivation from the rock-cut pier, is the absence of a base. The channels run directly down, and stop against or upon the platform or stylobate upon which the shaft rests; and at the top they are worked out again to the horizontal fillets or annulets of the capital. The number of these channels is always even. As has been said, the number of twenty was usually employed, although in one example—that of the Great Temple at Pæstum—have been found columns of twenty-four flutes in the exterior order, and columns of twenty and even as few as sixteen flutes in the interior. But in the best examples in Athens, the number is invariably twenty, while their section is always semi-elliptical, or, in early work, the segment of a circle.

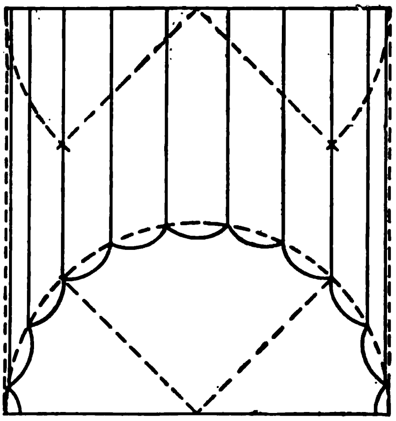


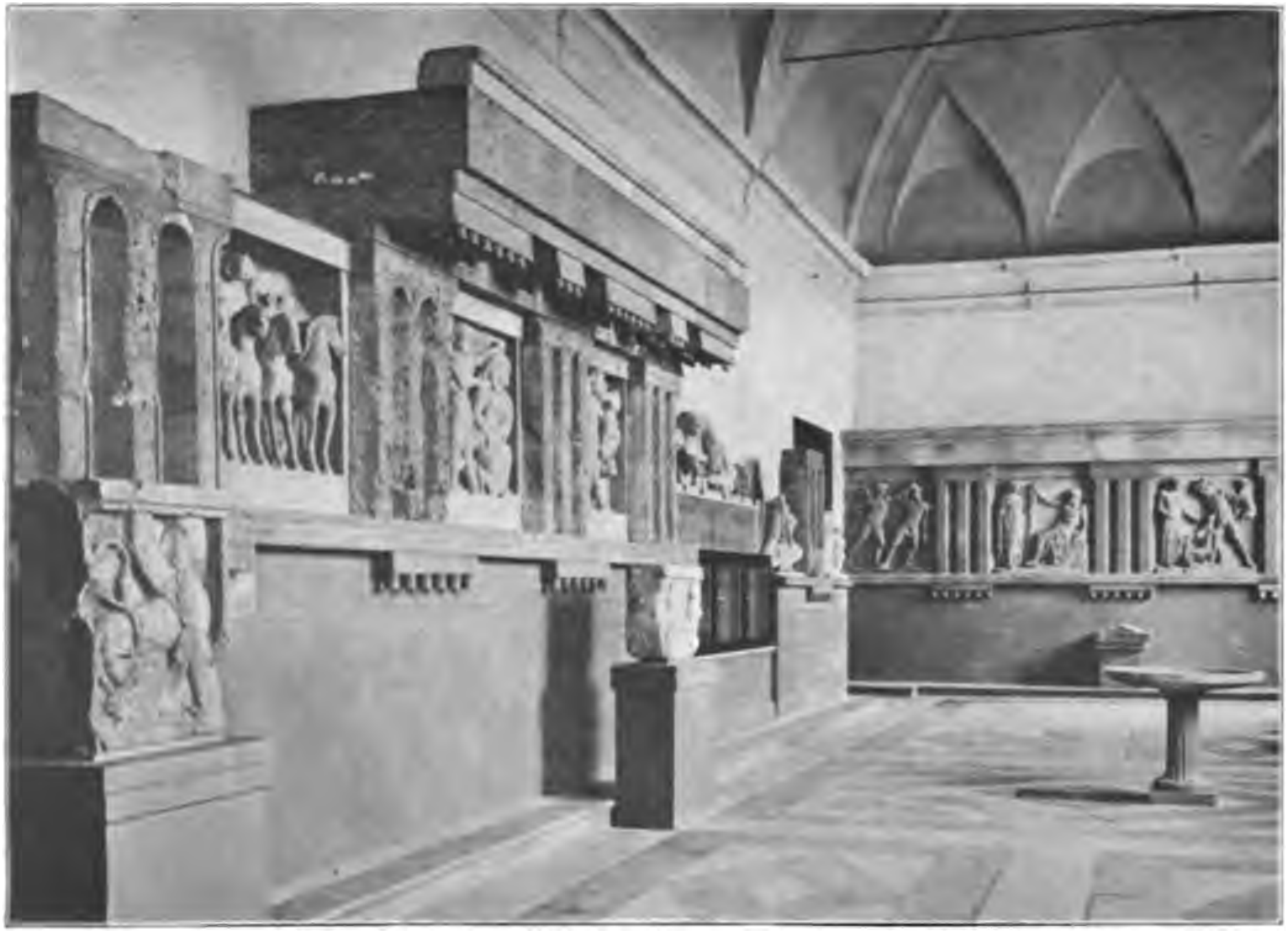
Fig. 55. Method of Fluting Greek Doric Columns.

The Greek Doric Capital. The capital of the Doric order consists of two principal parts, a plain **Abacus** and a moulding of refined outline termed an **Echinus,** with generally three **Listels** or **Annulets** below it. The abacus, or upper member of the cap, is a plain block, rectangular in elevation, and is the only member of this column that is square in plan. The echinus, or lower member of the capital, is in vertical section always a freehand curve. This curve approaches an ellipse or hyperbola, the lower part of which ends in a series of fillets varying from two to five in number. These fillets carry around below the echinus moulding, and separate the capital from the channeled neck or shaft of the column. A necking is sometimes suggested by separating a certain portion of the column from the remainder of the shaft by a deeply sunk channel. This square channel or sinkage takes the place of an astragal; and the necking of the column cap is always either plain or fluted, being treated to agree with the column shaft. The total height of the Doric capital is one module, or one-half the column diameter at the base.

General Rule for Height of Shaft. The proportion of the necking to the base of the column, as shown in the order, Plate XXXVIII, is as 48 parts or minutes compared to 60; while the height of the shaft, including the capital, varies in ancient examples, but, for our present purpose, may be taken as being seven diameters of the column, as shown in Fig. 50. The column used on the Parthenon will, by reference to the example in Plate XXXVII, be found to be only five and one-half diameters in height, instead of the seven diameters which has just been recommended. But this apparent contradiction is explained by two facts. In the first place, the column of the Parthenon is undoubtedly the most perfect that could be devised for use as it is there employed—in very large size and under a wide, flat, spreading pediment with a long colonnade on each returning side of the building. But for modern purposes, where no such grandeur of scale is possible, some considerable change is advisable; as the column would not be nearly so large, it requires rather a slender and graceful than a sturdy shaft. The fact that the columns would be placed farther apart than in the example of the Parthenon, also necessitates the acceptance of a quite different principle to govern their composition, although we should adhere directly to the general Greek lines, and as for most purposes the Order would be reproduced to-day in wood, this consideration would also tend to lighten the proportions and effect of the shaft.

The Stylobate. The steps forming the stylobate on which the column rests should be a certain proportion of its diameter, and each step should not be less in height than fifteen parts, or one-quarter of the column diameter. In Plate XXXVIII is shown one of these steps at the correct proportion as regards the Order as a whole; while another instance of their correct use is shown in the plate illustrating the small temple of Diana Propylæa at Eleusis (Plate XXXV).

The Entablature. Architrave. Above the column is placed the entablature, with the architrave resting directly on the abacus of the capital Its lower division, or architrave, shown in Plate XXXVIII, is merely a plain stone lintel laid across and upon the supporting columns and carrying in its turn the frieze. This lintel equals in thickness the width of the column at its neck, and between the capitals forms a soffit which, in this Order, is left perfectly plain. This architrave is so arranged that the joints always correspond with the axes of the columns, except at the column on the angle where there is no joint on the principal façade.



Fragments of Greek Doric Entablatures from Selinunte, Sicily, now in the Museum at Palermo.
Showing triglyph, metope and mutule treatment and disposition.

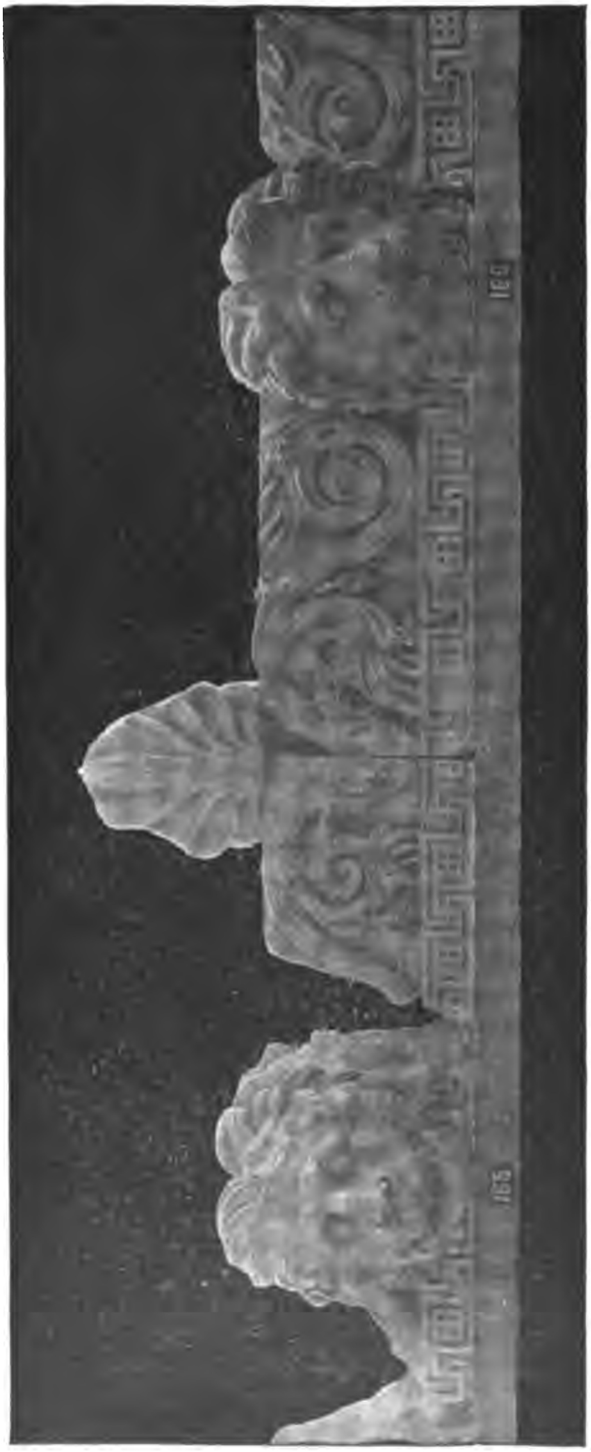
The only mouldings on the architrave are the listel and the tænia which crown it, and which serve to separate it from the frieze. The listel or regula is quite small, and is used in short sections occurring directly beneath the triglyphs in the frieze above, being always of a length to correspond to the width of the face of the triglyph. Six conical drops or guttæ are placed at regular intervals beneath, and hanging from, the listel.

Frieze. The frieze, resting directly on the tænia or architrave, is decorated by ornaments termed **Triglyphs,** that are used only on the face of the Doric entablature and remain its most distinctive feature. These triglyphs are blocks, rectangular in shape, and of a height in proportion to the width of the column, spaced evenly along the face of the frieze, and having their faces carved with two perpendicular, incised channels or sinkages, V-shaped in section; and two half-channels on the corner edges running from the top of the tænia to just below the lowest member of the cornice, where they are stopped, or again worked out to the surface of the triglyph. These channels imitate the cutting of the ends of wooden beams resting upon the transverse architrave or lintel. Generally the width of the triglyphs is very nearly equal to one-half the column diameter at the base, and they extend in height from the top of the tænia to the bottom of the lowest member of the cornice, which is broken around to receive them. The regula and dependent guttæ hang on the face of the architrave below, and in line with the triglyph in every case. These guttæ are pyramidal or conical-shaped blocks or drops representing either portions of the early wooden construction, or they may have been suggested by dependent drops of water.

Disposition of the Triglyphs in the Frieze. It is interesting to take some account of the manner in which these triglyphs are placed in the frieze. Generally they occur above each column and in the middle of the space between the columns (see Fig. 58 and Plate XXX-V); but in all Greek architecture there is an exception in their placing on the angle of the building, where they are brought out to the extreme edge, so that the respective corner triglyphs on the two sides come together or miter, on the angle, showing one complete triglyph on each side of the building, but both possessing the corner half-channel in common. Except on the corner of the building, as shown in Plate XXXVIII, the triglyphs occur directly over the center line of the columns or over the spaces beneath, as will be shown more exactly in taking up the intercolumniation of the Greek Orders. As a result of placing the corner triglyph, not over the middle of the column but on the extreme angle of the frieze, the next triglyph does not occur over the center of the space between these two columns, but is placed *equally distant* between the two neighboring triglyphs. This disposition, if the spacing of the columns below remains the same, necessarily gives the two last metopes a dimension different from the others. But, by slightly altering the intercolumniation of the columns that occur on the angle of the building, and making them a little nearer together than those on the rest of the colonnade, the inequality can be so distributed that it will not be observed. The column at the angle is sometimes heavier and more strongly inclined toward the interior of the building in order to assist in rendering these irregularities less apparent, and also in part to conform with the laws of ocular stability and so make a better effect upon the eye. The space between the triglyphs, always square, is called the **Metope,** and in many of the Greek temples was decorated with sculpture in relief, whose extreme face was nearly in plane with the face of the frieze.

The placing of the triglyphs directly on the corner, and the recessing of the metope faces in order to have the triglyph face in plane with the architrave face, are two distinctive customs of Greek usage that are at variance with the later Roman examples of the Doric Order; although there is no parallel case, so far as the corner treatment is concerned, in real Roman work.

Cornice. Above these triglyphs and metopes, and breaking around them, runs a small band and a fillet, above which occurs the rest of the Doric entablature, composed of two parts, a bed-mould and **corona,** the principal one being the corona, serving, as we have already said, to throw the water that falls upon the roof to a certain distance from the foot of the edifice. This corona—which, because of its use, is the most essential member of the cornice—is a strongly projecting part, and is accompanied on its under side by a series of inclined mutules of the same width as the triglyphs. These **mutules** are placed directly over each triglyph, and have in turn guttæ—generally eighteen in number arranged in three rows of six guttæ each—depending from their soffits, the guttæ being invariably round in plan and comparatively shallow in depth. Occasionally the space between these mutules and



Fragment of Cyma.
From the Tholos, Epidauros.

over the metope is left plain, or it is sometimes paneled, while in other cases another mutule is inserted directly over the center of the metope below. Occasionally, though more rarely, there are instances where the guttæ and regula below the tænia are also placed beneath this interpolated mutule and below the plain space of the metope. In the example of the Order shown in Plate XXXVIII, these mutules are shown with eighteen guttæ, as may be seen in the small plan of the soffit drawn at the right of the column. The mutules themselves in Greek work are generally sloping. The plan of this cornice soffit also shows the treatment on the corner angle, where the square space left between the two mutules is carved, generally after the fashion shown in this example.

The corona is surmounted by a separating moulding that is found again across the pediment; while crowning all is the gutter, the face of which generally forms the **cyma** of the cornice; and this exterior face is oftentimes decorated with the heads of lions, from whose open mouths spouts the water escaping from the roof. The cyma is repeated on the sloping cornices of the pediment, but the lions' heads, having no utility, are here omitted.

The mouldings of the Doric Order are never given sculptured ornaments.

GREEK MOULDINGS

The various divisions of an Order are adorned with mouldings projecting beyond the face of the parts to which they are applied. They vary somewhat in shape, ornamentation, and number, in the different Orders. There is more difference in this particular between the Doric and Ionic Orders, than between the Ionic and Corinthian.

The principal Greek mouldings are illustrated in Fig. 46, and will now be described. The **fillet** or **listel,** a narrow flat moulding (A), is seldom used alone, and generally with a larger moulding. When the fillet broadens out, it becomes a **fascia,** a name more properly applied to the several plain faces comprising the architrave (I).

The **astragal** (C) is the name of a small moulding whose outline is a half-circle. A large astragal is called a **torus** (O). In ordinary use the heavy moulding at the base of an Ionic or Corinthian column is a torus, while the light moulding separating the shaft from the necking of the capital is called the astragal.

Echinus (E) is the name of a moulding whose outline is somewhat like the segment of an ellipse. In Roman work the echinus is debased to a quarter-round (K) in section, drawn with an exact quarter-circle.

The **cove** (D) is a concave moulding whose profile is the arc of a circle or of an ellipse.

The **scotia** (L) is a concave moulding whose outline is a cove. This moulding is generally used between two toruses at the base of the column.

The **cyma** (F) has an outline composed of a concave above and a convex below; it may be considered as compounded of a cove and a quarter-round.

The **ogee** (B) is the reverse of the cyma, convex above and concave below—or, as it were, a quarter-round above a cove.

The **corona** (G) is the term applied to the upper projecting part of a cornice, between the crowning moulding or cyma and the lower edge or soffit of the projection; its principal purpose is to shed rain water beyond the face of the wall. The underside of a corona is termed the **soffit** (H).

A characteristic Greek section is that shown at M—the **beak-moulding** so-called—where the member is deeply undercut for the purpose of forming a drip.

Mutules and triglyphs, distinctive parts of the Doric Order only, will be defined more thoroughly later on when discussing that Order.

All these mouldings may be indefinitely varied to suit their location and purpose. They may have more or less sharpness of outline, more or less projection, and invariably derive their effect solely from the play of light and shade upon their surfaces. Their architectural character is determined even more by the *refinement*, than by the sharpness or flatness, of their outline. By combination in different groups, we obtain a body of mouldings whose outline will have a character depending on the greater or less *projection* of the different members used in the composition. Sharp outlines result from marked projections; blunt outlines, from slight projections; and "limp" outlines are the result of a composition in which all the mouldings are of equal importance. Accordingly, in architectural design, the study of profile with regard to the action of light and shade across its surface is of the utmost importance; and the use of mouldings is further com-

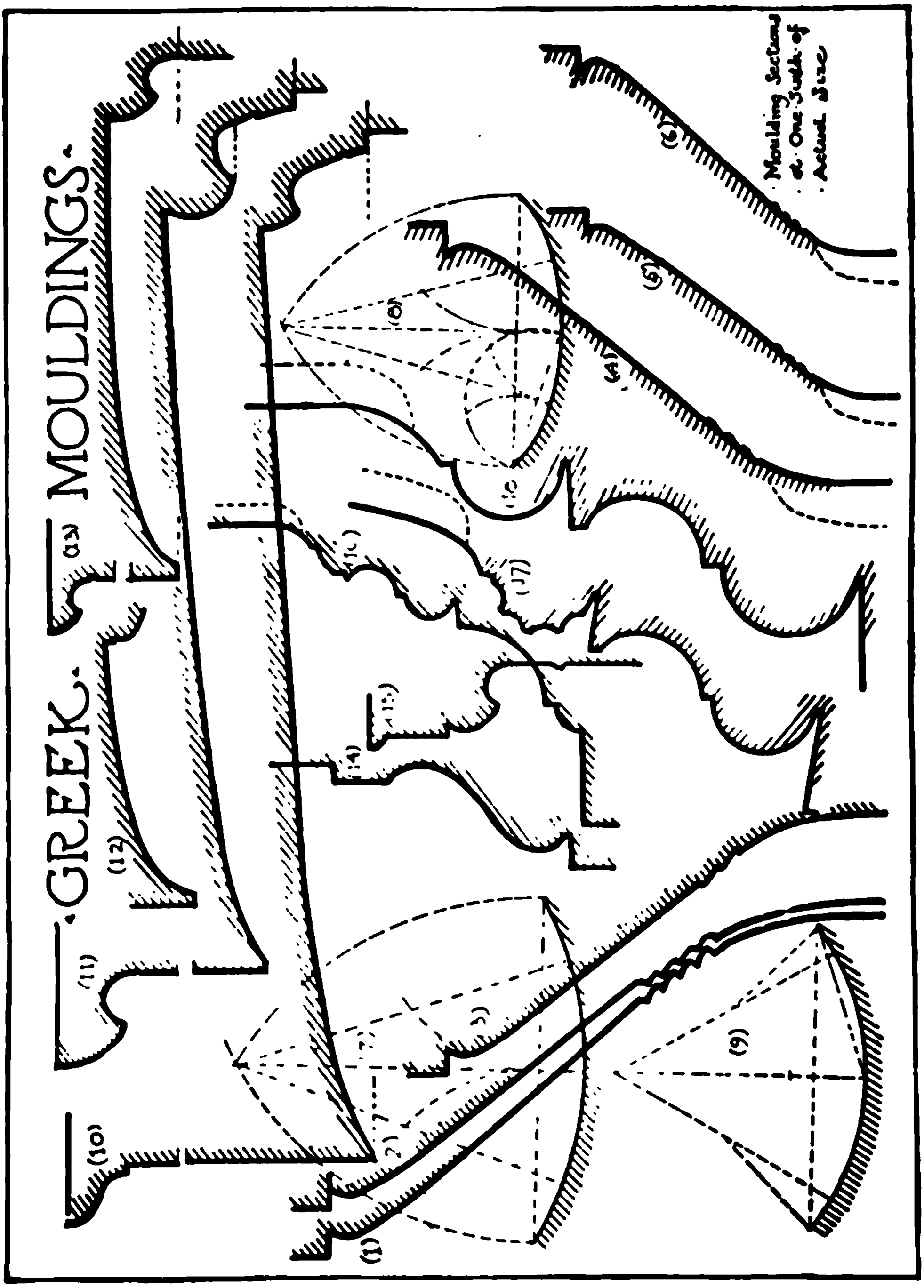


PLATE XXXIX.

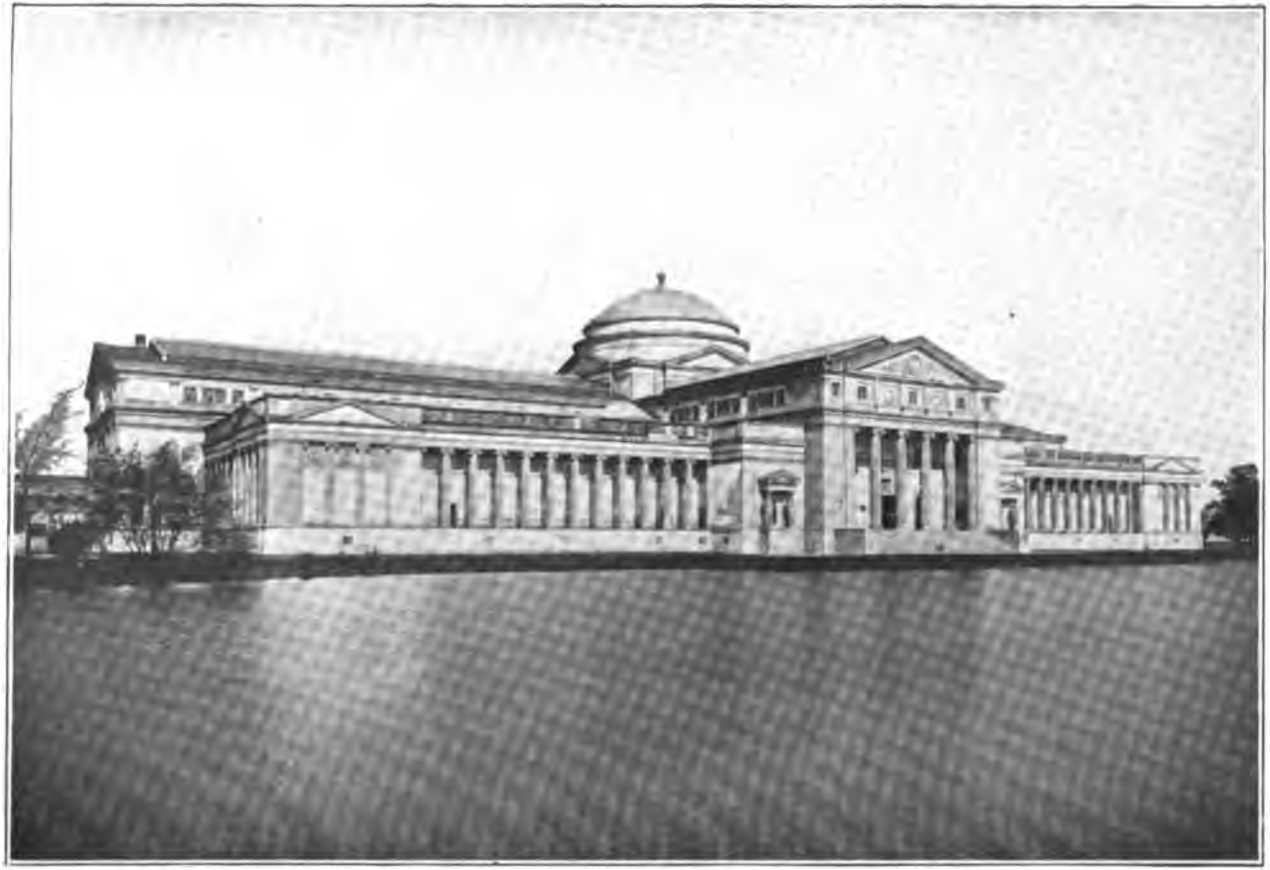
(A reproduction at small size of Portfolio Plate XXXIX.)

plicated by their decoration with carving, or, as was done by the Greek artists, even with painting.

The use and proportions of these mouldings should also be studied in the plates devoted to the illustration of Greek architecture and the Greek Orders, and in Plate XXXIX, in which some of the most characteristic sections are shown at one-sixth their actual size. In this plate, the mouldings numbered 1, 2, and 3 are sections taken from capitals of the Parthenon, showing the echinus moulding and the channelings beneath it. Mouldings 4 and 5 are from capitals of the Propylæa at Athens; and moulding 6, from the Theseum. Mouldings 7, 8, and 9 indicate the method of determining the flutings on the shafts of the various Doric columns used in the Parthenon. Moulding 10 is a section through a portion of a cornice at the Parthenon. Moulding 11 is from the Propylæa; moulding 12, from the Erechtheum; and moulding 13, from the Theseum—all at Athens. A base moulding from the Theseum is shown at 14, while at 15 the cap of an anta from the same temple is illustrated. Moulding 16 is taken through the base of the column of the Monument of Lysicrates, and extends to the face of the course upon which it sets. Mouldings 17 and 18 are bases from the north porch of the Erechtheum, one taken from the base of the column, and the other from the accompanying anta.

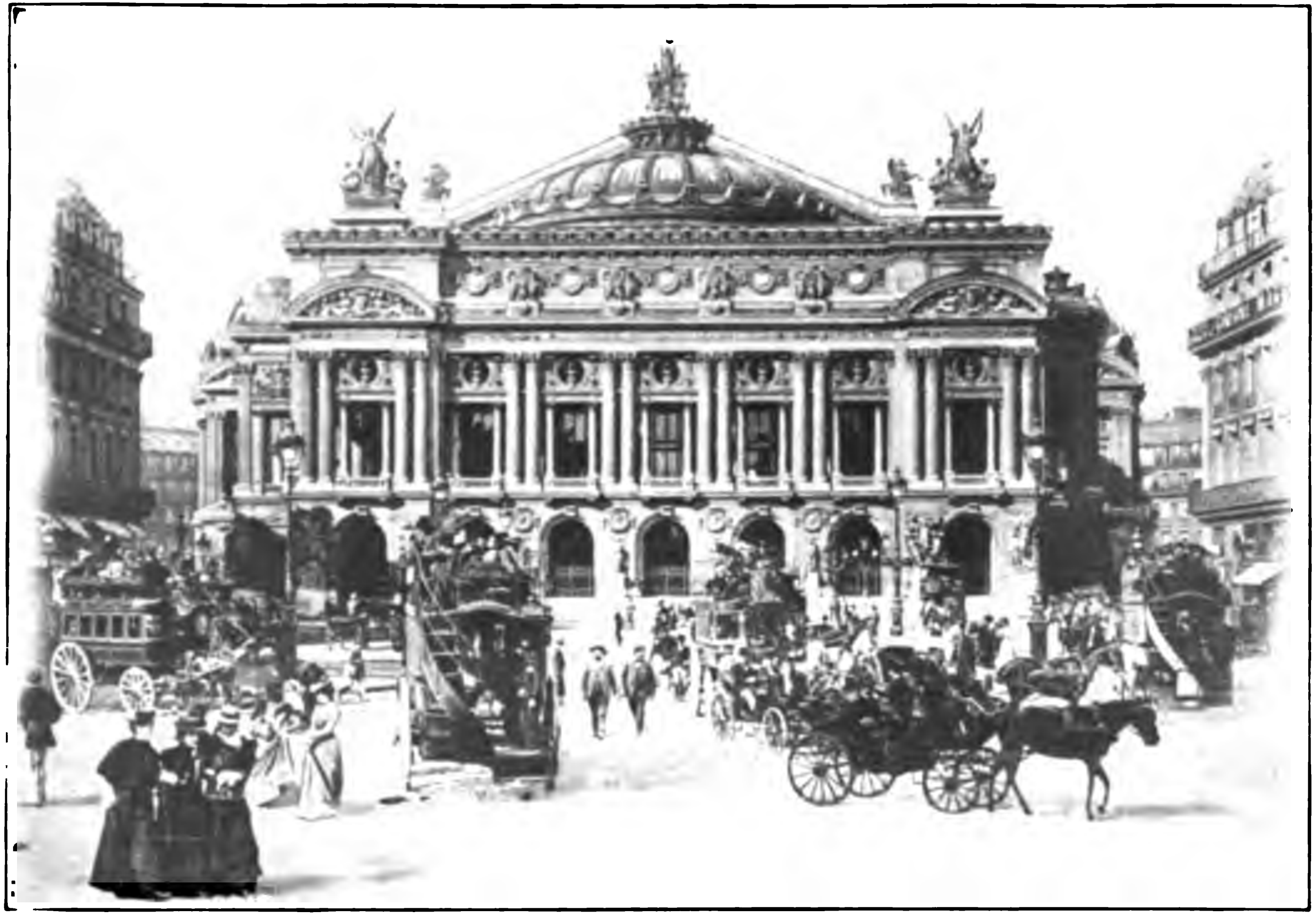
It must be noticed that the sections of Greek mouldings are totally different from those afterward developed by the Romans. The members or mouldings composing the Greek entablatures and used throughout their buildings and Orders, are very strongly characterized; and were designed with a sole regard to their effect in gathering shadow and forming a drip to throw off the water running over them, and so protect the face of the stonework below. These mouldings were cut quite without any regard for the expenditure of time or labor, and for that reason they are very difficult to reproduce under modern conditions.

In any use of Greek motives, or in any place where the Greek effect of purity is desired to be obtained, particular care should be taken to use the characteristic mouldings which the Greeks themselves developed to such a wonderful degree of refinement and perfection; and we should acknowledge, by copying these sections as exactly as possible, the fact that they are indisputably more perfect and distinctive than any variation that we are likely to invent to-day.



FINE ARTS BUILDING OF THE COLUMBIAN EXPOSITION OF 1893 IN JACKSON PARK, CHICAGO
Burnham and Root, Architects; Charles B. Atwood, Designer

This building was the home of the Field Columbian Museum from the close of the exposition. Early in 1916 the foundations were started for a new building located at 12th street and Grant Park, to cost $5,000,000.



OPERA HOUSE, PARIS, FRANCE

Jean Louis Charles Garnier, Architect. Built in 1868-1875.

These mouldings are of a fineness that requires their execution in the finest materials, in which alone they can be cut with any degree of refinement and truth. This cutting, too, requires a skill and care on the part of the workman that may be attained to-day only under the most exceptional conditions and at great proportional expense. Each bit of detail or moulding should be produced with the utmost exactitude from some careful study of the original Greek form. The least hesitation in touch or carelessness in handling must result in a definite blemish.

Decoration of Mouldings. It will always be noted that certain mouldings bespeak certain definite and characteristic carved or painted ornaments. In Plate XL are shown some Greek mouldings with the proper accompanying ornaments which the Greek sculptors devised to enrich and increase the effect of the different moulding sections. The fitness of the ornament to emphasize in all cases the contour of the moulding section, should be especially noticed. It does not confuse and hide the member as a whole at the expense of the shadow effect which its contour is designed to produce, as is often the case in later Roman work; but in each instance the placing of shadow on the carved member helps to accent and increase, for the spectator, the outline effect of the complete moulding.

At K, L and N are shown various modifications of the well-known **Greek fret, or band ornament.** This ornament is used in a great variety of forms, and, as employed by the Greeks upon plain surfaces, must be considered the most perfect decoration that has ever been evolved from the use of a geometrical figure composed solely of right-angled lines.

The **guilloche,** or **woven-band** moulding, shown at O, as well as the simpler form at M, also embodies a distinctive Greek method of enriching a flat or slightly curved band, while the same design is frequently employed on the torus moulding (C).

The so-called **running dog** or **Vitruvian wave** moulding shown over the guilloche at M, is also a typical Greek decorative ornament, and is used in much the same maner as is the fret. At P and Q are shown two portions of the **palmette** or **honeysuckle** and **akroter** ornament, consisting of two alternating plant forms connected by scrolls. These examples are taken from the pilaster and column

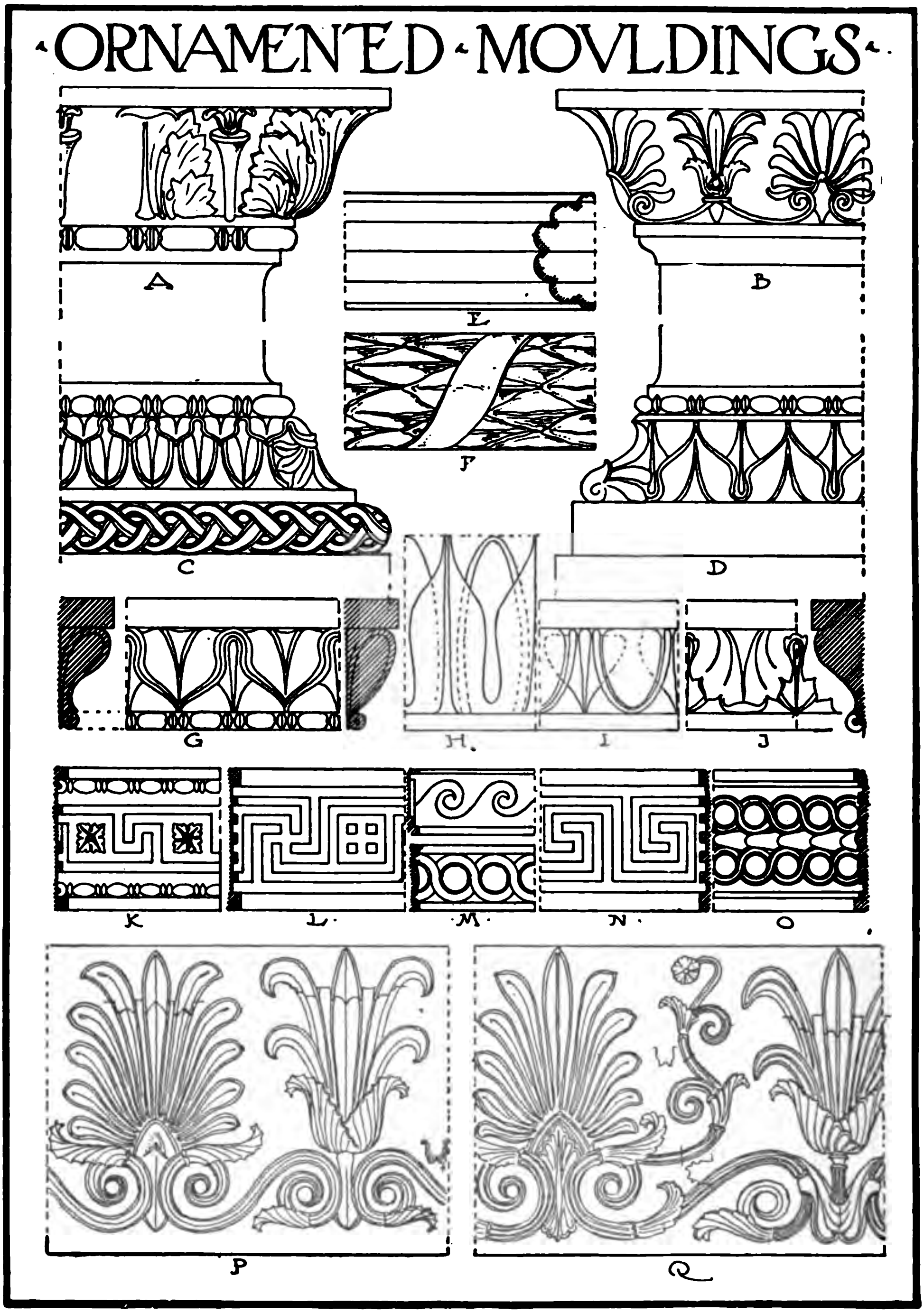


PLATE XL.

(A reproduction at small size of Portfolio Plate XL.)

supports, as well as to increase the bearing area of the column—just as the horizontal mouldings of the base suggest a double structural purpose in binding together the bottom of the delicate support, and broadening its bearing area. The projecting parts of this short beam would naturally be treated in some decorative manner, and so the general form of the Ionic volute might have been easily produced. But we must again allow that in its introduction to Greece, the form of the Ionic capital was so materially modified that it has little close affinity with the earlier Mycenæan, Assyrian, or Phœnician motives.

The approximate height of the capital is a little less than one diameter.

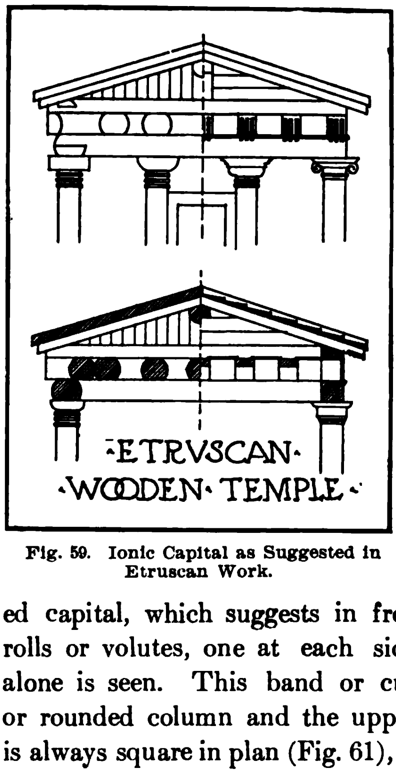


Fig. 59. Ionic Capital as Suggested in Etruscan Work.

The next principal feature of this Order, and the one that renders the column distinctive in itself, is that the capital has two separate faces—one in plane with the frieze above, showing the volute; while the other, at right angles to this, shows the end of the capital or roll of the volute, as may be seen in Figs. 60 and 61.

As we have said, the capital of the Ionic column has two principal faces and two lateral or subordinate ones. The principal faces show the winding-up of the two volutes, or the eyes formed by the band laid over the moulded capital, which suggests in front elevation a cushion with two rolls or volutes, one at each side, while at the end a single roll alone is seen. This band or cushion comes between the turned or rounded column and the upper member of the capital which is always square in plan (Fig. 61), and it is of the shape of the echinus moulding in perpendicular section, the latter being sometimes plain but more generally carved or decorated. The side showing the volute, which we have already called the "face," is always in the same plane as the architrave and frieze of the building, and facing out toward the spectator; the opposite face is precisely like it.

friezes of the Erechtheum at Athens. This design is frequently used on a crowning cyma moulding of large size (B).

The **egg-and-dart** moulding (I) is a succession of repetitions of forms derived from the egg and the arrow, and is a characteristic decoration of the echinus or quarter-round.

Beads, or **reels and beads** alternating singly or in groups, are the characteristic ornament of the astragal (A, C, D).

The **leaf-and-dart** (G, J,—water plant and arrows) is applied to the ogee.

IONIC ORDER

Origin of the Ionic Order. Very possibly, at about the same time as the Doric column was slowly developing from the rock-cut pier, the use of tree trunks for support had suggested a circular tapering form of a column to those nations who erected their buildings of wood. It is very likely that the early columns were first used as a form of nature worship, in which case their derivation from the trees would very naturally cause them to be employed particularly in temples. We know that one form of Egyptian column was modeled closely upon the palm tree. We have already seen in Egypt the beginnings of the Doric column, and we shall soon find in the Corinthian another form that may have been either borrowed from or suggested by Egyptian precedent. So it is that, for the original of the Ionic Order, we must go back to the tree, just as we have to the rock-cut pier for the Doric. Everything points to this—the lightness and grace of the column itself; its entasis, which nearly approximates the natural diminution of the trunk of the growing tree; as well as the simple entablature of moulded members, all running horizontally and at right angles to the perpendicular lines of the column. This Order is as evidently developed from the wooden buildings of the plains as the earlier Order was from the rock caves of the hills; and, in adapting it to use in stone, much of its character was preserved.

Essential Differences between Ionic and Doric Orders. The Ionic Order being a later growth than the Doric, is much more generally graceful in its proportions, and even the early examples do not show the clumsy processes of growth to the extent that we have found in the study of the preceding Order. Either these examples have been destroyed, or, what is quite as likely, the Greek artists adapted their experience in developing the Doric column, directly to this more delicate form. At any rate, we find that all the examples remaining in Greece may almost be considered as perfect types. The greatest number of examples of the Ionic Order are found in Asia Minor, and are generally of less value and of a later date.

The most marked change to be noticed is that evidenced in the entablature itself, where we find that all the ornaments in the frieze and soffit of the cornice, which characterize so distinctly the Greek Doric Order, have been done away with, and that both spaces are now left plain. The entire entablature now consists of simple, horizontal mouldings such as would be most appropriate to the nature of wood. This entablature is about the same proportion in relation to its column diameter as is the Doric, being two diameters in height. The column being higher than the Doric, its effect is, of course, much lighter and more graceful, The architrave is very high and often entirely plain, while the cornice is low in height. This throws the frieze above the position it ordinarily occupies in the entablature—a feature also found, in fact, in the Greek Doric Order, although with a different effect.

The characterization of the first two Greek Orders, as given by Vitruvius, is suggestive. In speaking of the origin of the Orders, he states that the Doric reproduces the proportions of the body of a man, while the Ionic attempts to equal the graceful proportions of a woman, and so he gives the height of eight diameters to these Ionic columns. Following the same author, the base, which first appears with the Ionic column, represents the drapery of the woman's long gown gathered around the feet; and—to further follow out such a fancy—the volutes of the capital may suggest some methods of doing up the hair, while the channels of the shaft may typify the long, hanging folds of the woman's garments.

The opinion of Vitruvius is reproduced here, more for its value in strongly demarking the difference in character that actually exists between these two Orders. The Doric Order is the national Order of the Doric race—strong, vigorous, and austere; in its simplicity of detail, in its lack of decoration and sculptured moulding, it expresses not so much *beauty*, as *vigor*, in all the full, robust perfection of Greek manhood. On the contrary, the Ionic Order displays more of refinement and elegance; the ornaments are alike more varied and of greater richness; it becomes the national order of the Ionians, and acquires in their hands, in Greece in the century of Pericles, and in Asia with Phidias, the highest degree of grace and perfection.

It is simpler, however, to remember that while the Doric column represents the treatment of a stone form or pier, the Ionic, a lighter development, was more directly inspired by the trees and early round wooden shafts, and was first reproduced in stone at a period when the workmen had acquired sufficient skill in working harder materials to preserve something of the grace and lightness of the original.

Description of the Ionic Order, and Various Examples. The Greek Ionic Order is supposed by some to have come from the East, in the vicinity of Assyria and Persia. Some authorities claim that it was used in its present form first in the island of Ionia, whence its name. The column has a base, and a cap with characteristic spiral-shaped ornaments. The column is eight or nine times its diameter, in height, with, as a rule, 24 flutings. The entablature consists of the architrave, which has three fascias and a crowning member; the frieze, plain or sometimes decorated with a continuous sculptured bas-relief; and the cornice, having an overhanging corona and bed-mouldings, with sometimes a dentil course or egg-and-tongue mouldings.

The Erechtheum at Athens is the best known example of this Order, others being the interior columns of the Propylæa, the Temple of Diana at Ephesus, and the Mausoleum of Halicarnassus.

The Ionic Order was apparently used for the first time on the Artemisian Temple of Diana (or Artemis) at Ephesus, constructed about 580 B. C. In the fifth century this brilliant Order was used with much success in the Propylæa at Athens, where it is employed along with the Doric, in the small Temple of the Niké Apteros, or Wingless Victory; and in the Erechtheum.

The fourth century B. C. is, for the Ionic style, also a brilliant period, though it is no longer in Greece but in Asia Minor that we shall find the best material for study. There is the superb Tomb and the Temple at Priene, and the Temple of Apollo Didymæus; while Polonios of Ephesus and Daphnis of Miletus often employed the Ionic Order with the most consummate art.

In most of the temples of Asia Minor, there exists between the corona and the frieze a row of dentils used in much the same manner as on the Porch of the Caryatides on the Acropolis at Athens.

Height of Shaft. In the Greek Ionic buildings of which we possess definite remains, the columns vary in height between a little more than eight and a little less than nine diameters. The measurement of eight diameters and one-half, which Vitruvius gives to the Ionic column, may be considered as coming in the exact middle between these two extremes; although later authorities —for the same reason as already given regarding the Doric column—prefer to take the highest dimension as a standard for modern purposes. The diameter of the column at the top of the shaft varies from eight to eight and one-half tenths of its diameter at the base. Thus we see that this column has at once a higher, more slender, and more graceful shaft than the Doric, and that there is also less difference between the diameter at the base and neck than in the shorter and stumpier Doric shaft. On the Erechtheum, of which we have given a drawing in Plate XLIV, the height is a little less than nine diameters. The columns of the Temple of Apollo Didymæus are a little more than ten; but those of Athena at Priene are approximately nine diameters, and the Temple of Hera at Samos eight diameters and one-half; while on the little Temple of Artemis near the bank of the Ilissus, the column—according to Stewart, who has reconstructed it—has a height of eight diameters and one-fourth.

The Greek Ionic column has also much less taper than any of the Greek Doric shafts, while it is notable in at least one instance—that of the North Porch of the Erechtheum, or, more properly, the Portico to the Temple of Minerva Polias—that the Ionic columns have a swell or belly of $\frac{1}{134}$ their diameter.

Entasis. The taper on these columns is much less accentuated than on the Doric Order. We find that the larger diameter, in the middle, is one-seventh more than the smaller diameter. On the Erechtheum this diminution is of one-twelfth; on the Temple of Apollo Didymæus, it is one-eighth; and on the little Temple on the Ilissus, it is one-seventh. An entasis or curving contour of the shaft exists in a very delicate and subtle form in the Ionic Order.

Flutings. Next to its proportions, the distinguishing feature of the shaft of this Order is the radically different character of fluting which is invariably used whenever the column of this Order is so ornamented. While in the examples of the Greek Doric work it is found that the later columns are almost invariably fluted, and it is only the

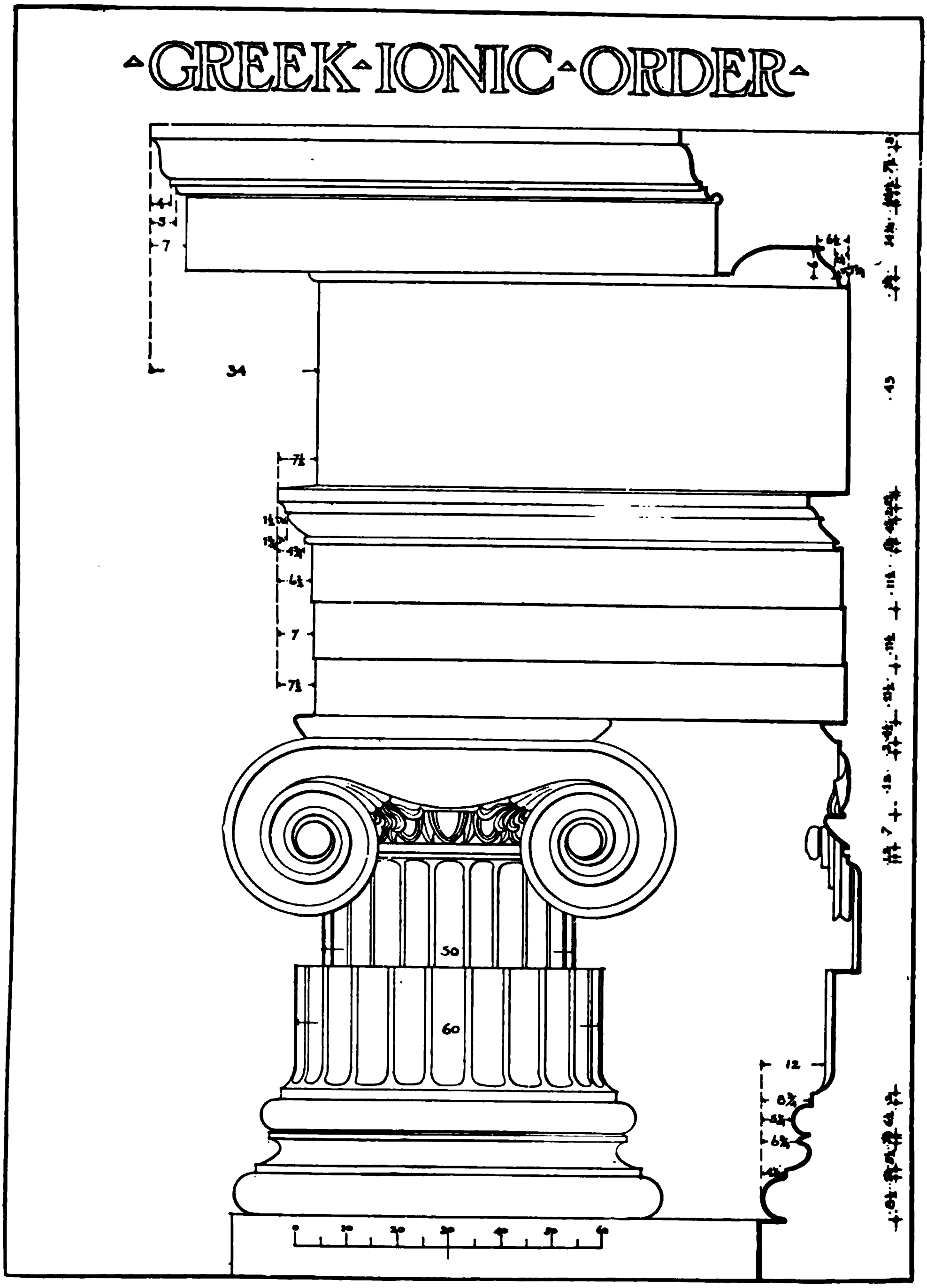


PLATE XLI.

(A reproduction at small size of Portfolio Plate XLI.)

earlier examples which were occasionally left smooth and plain, with the introduction of the Ionic column the question of fluting the shaft seems to have been left more or less to the discretion of the designer. There are late instances where this column has been left plain and unornamented, quite as often as early ones in which the fluting first peculiar to this Order is used. There are generally twenty-four channels or flutes—four more than in the Doric Order; and their section is as shown in Fig. 56, much deeper and approaching a half-circle in outline, while the channels are separated from each other by a ridge or "fillet," a part of the surface of the column shaft itself. We have already traced the probable growth and derivation of these channels in Fig. 49.

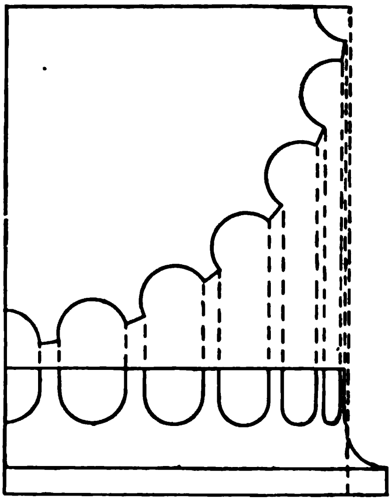


Fig. 56. Ionic Fluting. (Part plan and elevation.)

Bases, Ionic and Attic. The Ionic and Corinthian columns, being lighter, more elaborate in treatment, more refined in principle, and giving less of an effect of stability, seemed, unlike the earlier Doric, to require a base in order to give some apparent strength to the column as a supporting member. Otherwise the wide spacing of these columns, and the thinness of their shafts, would not satisfy the eye of the beholder. The base, besides fulfilling its purpose as an ornamental member, renders it apparent that a larger bearing surface is given the column, and that the weight it carries is thus distributed over a larger area of support.

A base of the height of one module, or one half-diameter, is therefore always used with this column. There are two sorts of bases, easily distinguished by the form of their mouldings:

The **Ionic base** is composed of a plinth supporting two astragals, and two scotias accompanying these two astragals, with fillets and a torus moulding. In Asia Minor, this base is subjected to considerable modifications.

The **Attic base** is more simple, and is composed of a torus moulding, a scotia with two fillets, and a large torus, the latter resting directly on the platform or steps around the temple, without the intervening square plinth (A, Fig. 57).

The base which usually appears with this order is of the Attic variety, circular in plan, and without a square plinth as in later Roman usage, with the exception of one type, that in the Temple of Minerva Polias at Priene. In Fig. 57 are shown the most typical variations of Greek Ionic column bases. That at A, taken from the Erechtheum at Athens, is generally termed the "Attic base", from the fact that it was most highly developed in Athens and the neighboring portions of the state of Attica. This base is sometimes varied by making the lower torus very small in height, and flattening the scotia, as in Plate XLII; but it still retains the characteristics of the Attic base. The base at B, Fig. 57, is the only instance in Greek work where they have employed with this Order a plinth square in plan and rectangular in elevation. The example shown at C, Fig. 57, is taken from a column at Samos, and is a somewhat unusual form. At Ephesus there is an example of the use of the Ionic Order where the base of the column is encircled by a dado carved with figures of considerable relief. The base shovn at D is from the Temple of Apollo Epicurius at Phigalia.

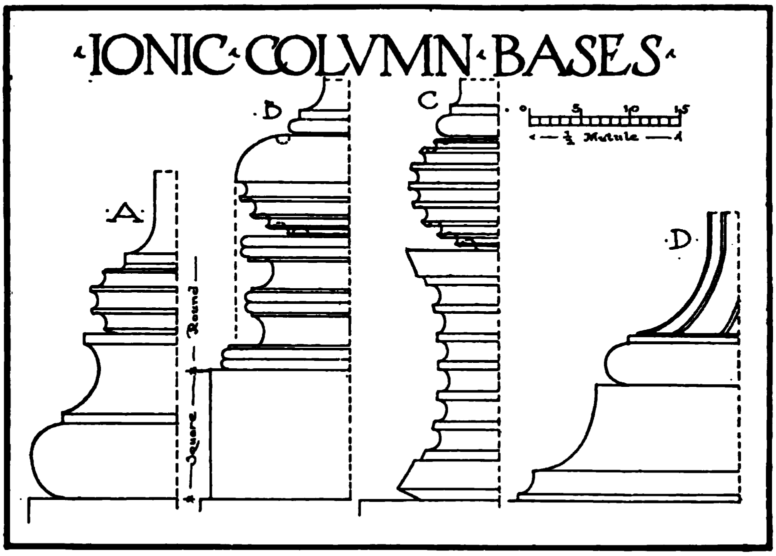
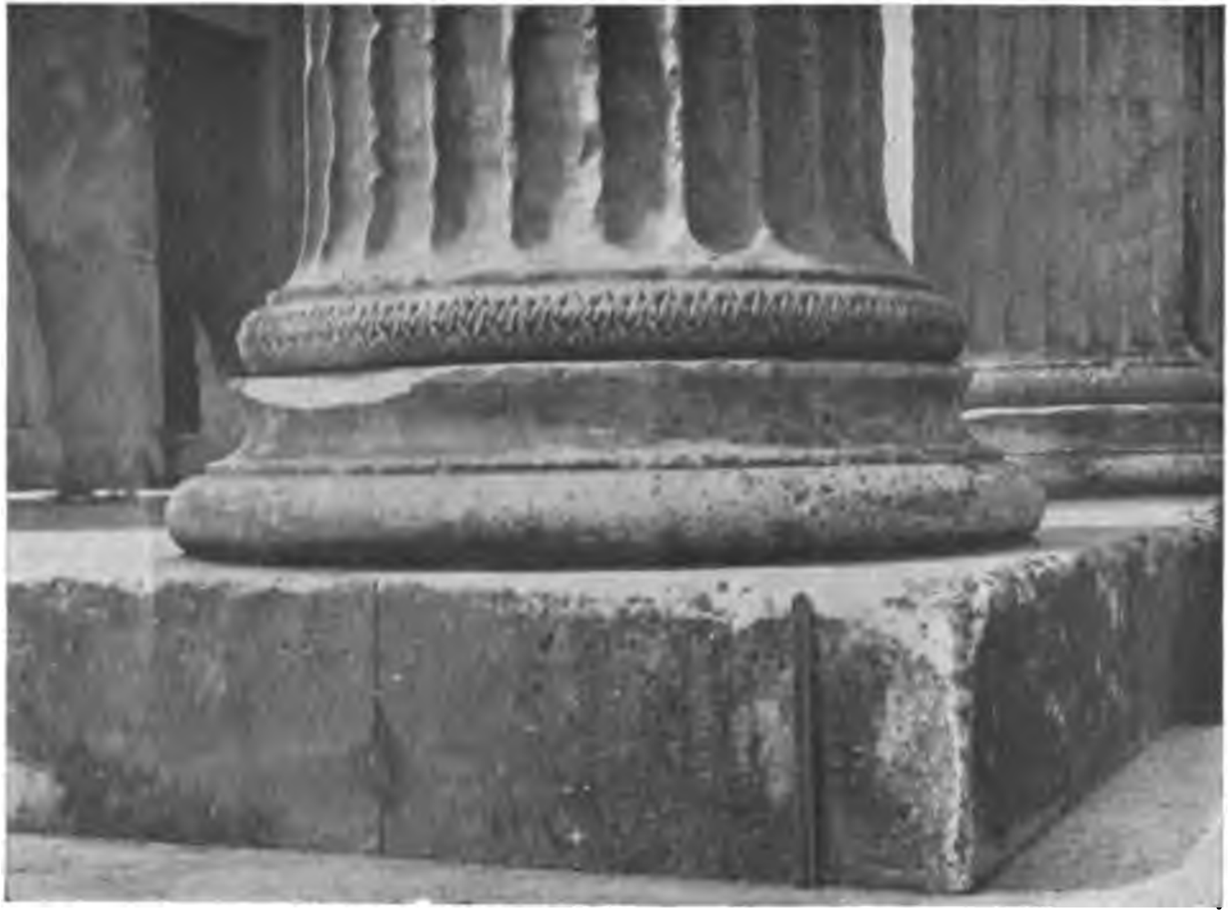


Fig. 57. Typical Greek Doric Bases.



Attic Base of Ionic Column from the Erechtheum at Athens,
Showing use of Guilloche Ornament on Torus Moulding

This type, as well as the accompanying form of capital, Fig. 64, is somewhat exceptional in Greek work.

The Volutes. The strongest characteristic of the column is the volutes which ornament the capital.

Various theories have been suggested as to the derivation of the decoration of the "volute" face or roll, a distinguishing feature of the Ionic capital. It is indubitable that the series of lines enrolling themselves into a spiral form, which appear upon the principal faces of the capital and make up the end of the rolls, was for a long time a favorite motive with early peoples, and that many examples are found in the works of Mycenæan art; that the face of the volute very nearly reproduces the natural form of certain seashells; and that the same spiral motive was known and employed by almost all primitive civilizations.

The Assyrians, in their decorative embellishment of the short cross-bar or wooden cap that they placed upon their columns, succeeded in producing a rolled-up decorative member that may have very readily formed the suggestion for the Greek Ionic capital. (See Fig. 58.)

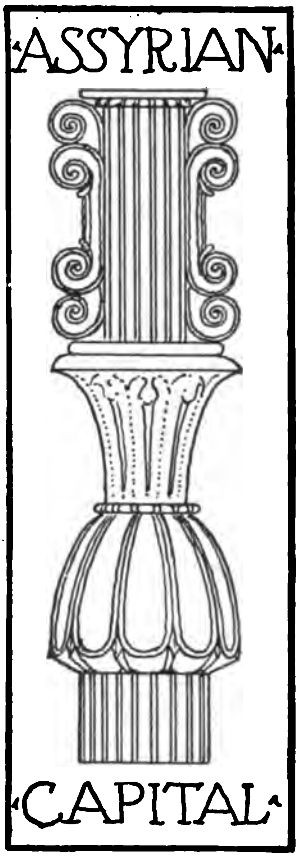


Fig. 58. Ionic Capital as Suggested in Assyrian Work.

The more ancient examples of the Ionic capital show the volute projected in such an extreme degree that it seems most unlikely that this decorative Order could have been developed from anything else than a wooden prototype, as such a form, executed in stone or marble, would seemingly be bound to split off under the load of the entablature. The sketch in Fig. 59 shows how this form of cap may possibly have been suggested by the Etruscan custom of placing a wooden cross-bar over the wood column, not only to tie it together and prevent it from splitting, but also to assist in reducing the width of the span between supports, as well as to increase the bearing area of the column—just as the horizontal mouldings of the base suggest a double structural purpose in binding together the bottom of the delicate support, and broadening its bearing area. The projecting parts of this short beam would naturally be treated in some decorative manner, and so the general form of the Ionic volute might have been easily produced. But we must again allow that in its introduction to Greece, the form of the Ionic capital was so materially modified that it has little close affinity with the earlier Mycenæan, Assyrian, or Phœnician motives.

The approximate height of the capital is a little less than one diameter.

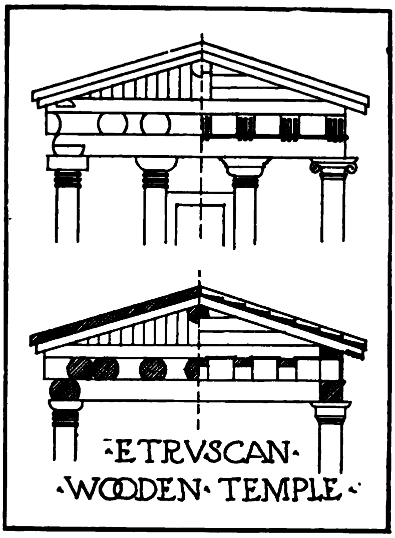


Fig. 59. Ionic Capital as Suggested in Etruscan Work.

The next principal feature of this Order, and the one that renders the column distinctive in itself, is that the capital has two separate faces—one in plane with the frieze above, showing the volute; while the other, at right angles to this, shows the end of the capital or roll of the volute, as may be seen in Figs. 60 and 61.

As we have said, the capital of the Ionic column has two principal faces and two lateral or subordinate ones. The principal faces show the winding-up of the two volutes, or the eyes formed by the band laid over the moulded capital, which suggests in front elevation a cushion with two rolls or volutes, one at each side, while at the end a single roll alone is seen. This band or cushion comes between the turned or rounded column and the upper member of the capital which is always square in plan (Fig. 61), and it is of the shape of the echinus moulding in perpendicular section, the latter being sometimes plain but more generally carved or decorated. The side showing the volute, which we have already called the "face," is always in the same plane as the architrave and frieze of the building, and facing out toward the spectator; the opposite face is precisely like it.

Arrangement of Volutes at Corners of Buildings. This arrangement is perfectly adaptable to a long colonnade; but when we reach the corner of the building, a difficulty at once presents itself. On one side or the other this capital must show a roll, which would not agree with the capitals beside it. The volute which distinguishes the Ionic capital almost prevents its use at the angles of a building, inasmuch as the principal face is always shown in plane with the architrave above, and, in turning the corner at right angles, some change is necessary in order to bring the two principal faces at right angles to each other. The Greeks invented two methods of overcoming this difficulty. In Fig. 62 are shown two plans of Ionic capitals for use on the corners of buildings. The first—an exceptional one—is taken from

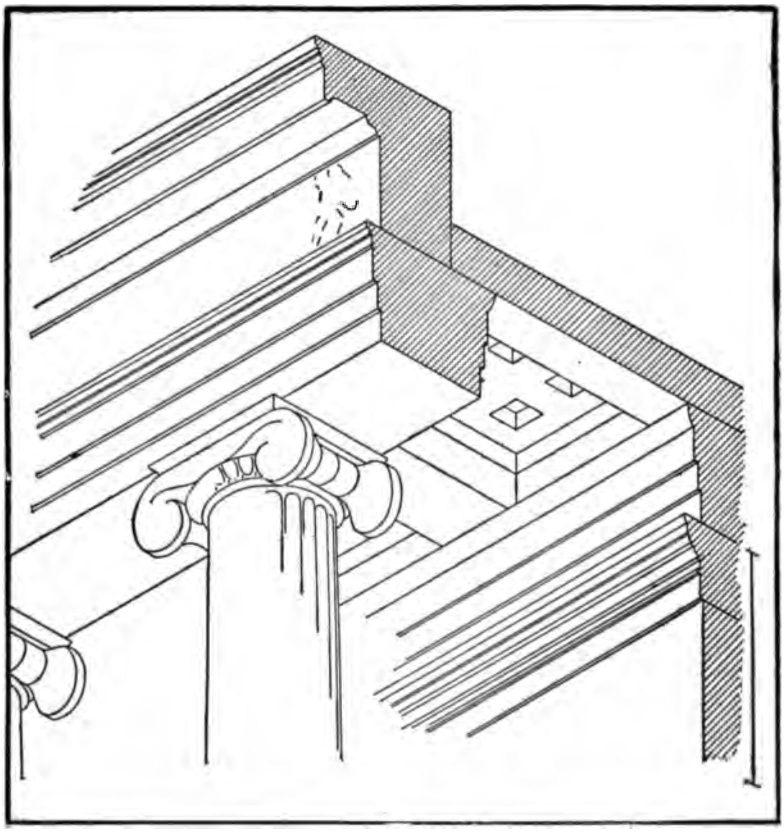


Fig. 60. View Showing Two Faces of Ionic Capital.

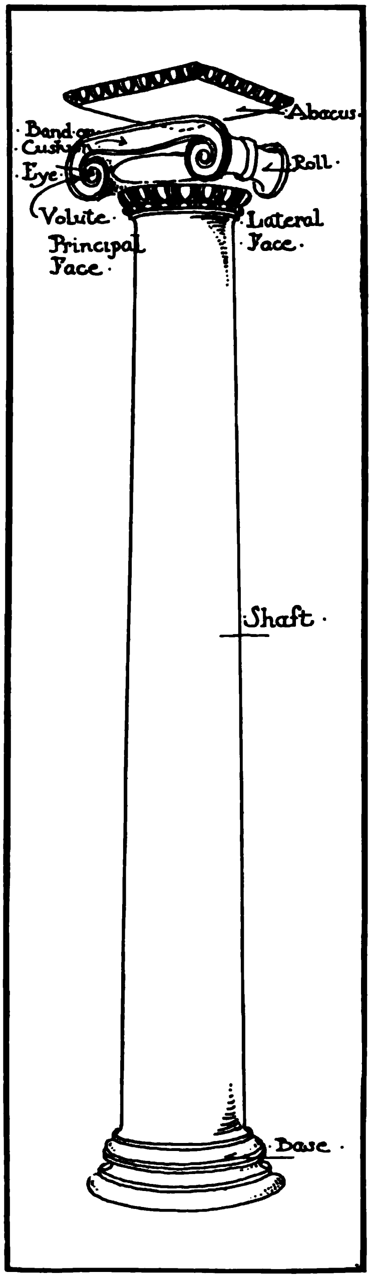


Fig. 61. Ionic Column.

the Temple of Apollo Epicurius at Phigalia, where all four sides are alike, and the volutes coming together on the angle are, in plan, bowed out on each corner so as to be almost back to back at the extreme angle. This capital is shown in elevation in Fig. 64. The other and more usual method was to place the two principal faces of the ordinary capital at right angles to each other, the volutes on the outer corner following the same method in that one angle as on the four angles of the capital just described, and the two volutes at the other ends being kept in plane with the architrave above. This also brings the two rolls or lateral faces at right angles to each other, and requires a certain dislocation of their elements, which may be better seen in Fig. 63, where two capitals from the Temple on the Ilissus at Athens are shown side by side, one of these being that on the corner, and the other the ordinary capital of the colonnade. The Greeks themselves seemed to favor this latter solution, and in most instances employed this scheme on the capitals at the angles of their buildings. Perhaps this was partly because it allowed them the use of the decorated Ionic form, to which they were especially partial.

The Plain Ionic Capital. There are two kinds of capital used with the Athenian Greek Ionic Orders,

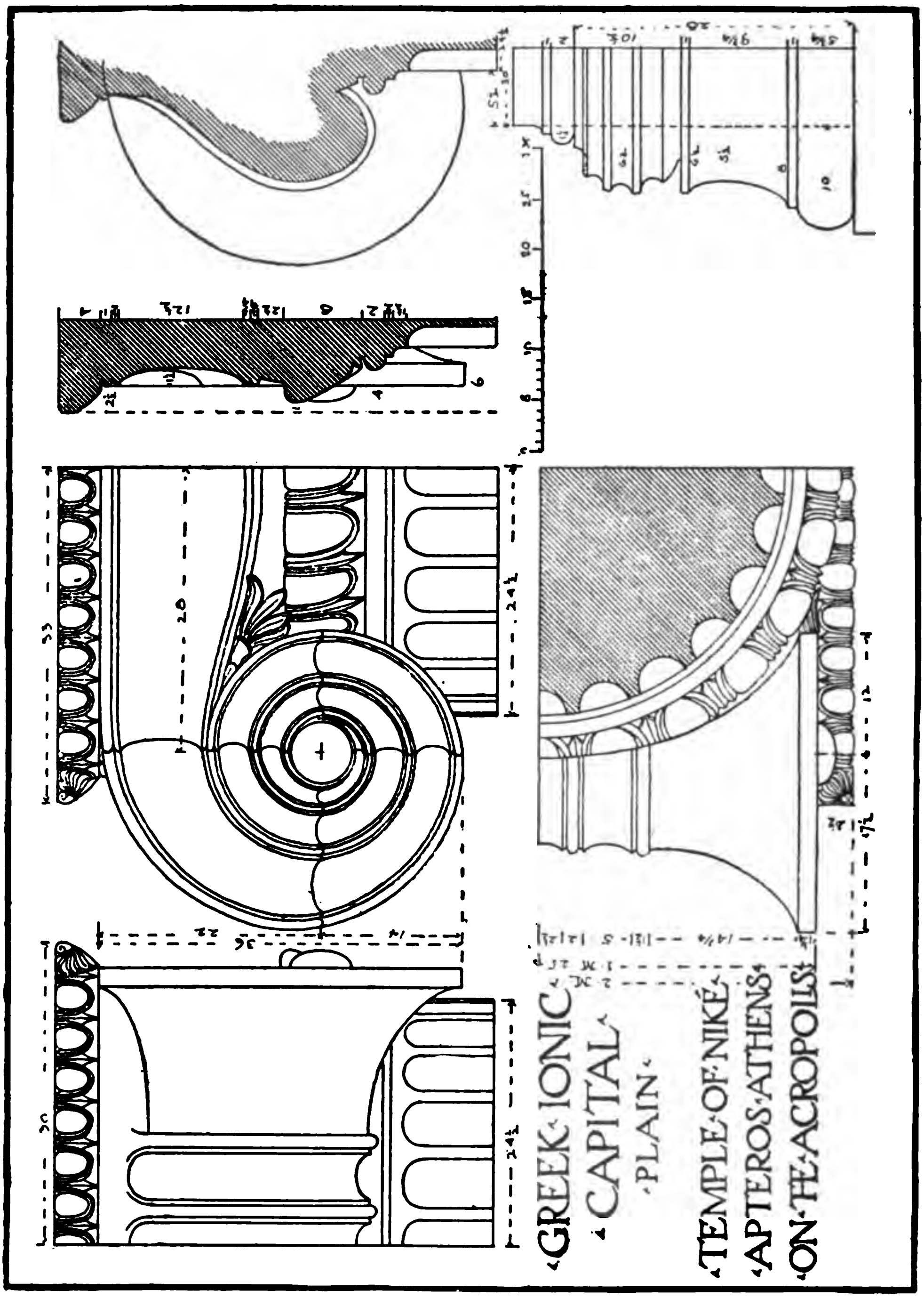
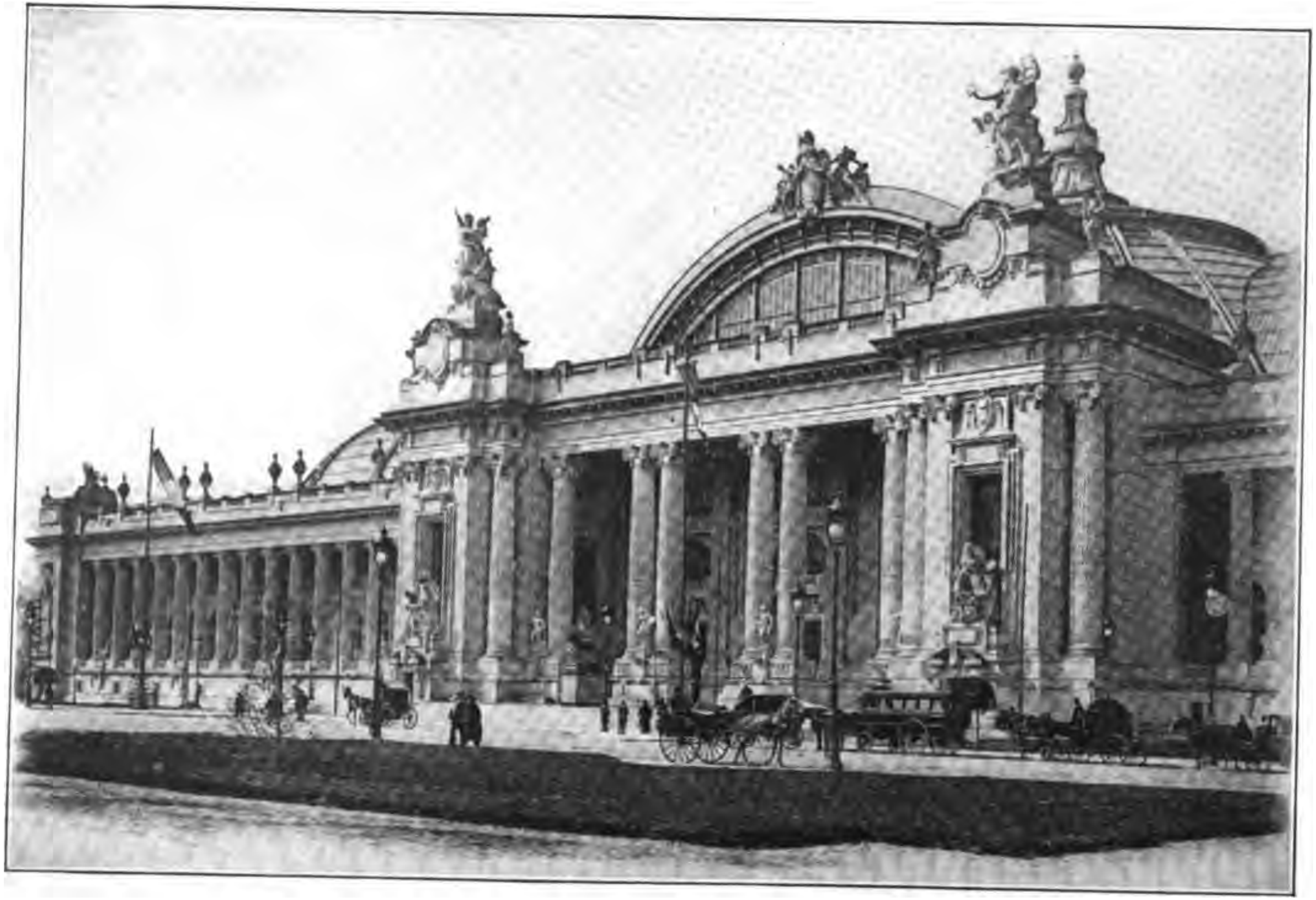


PLATE XLII.

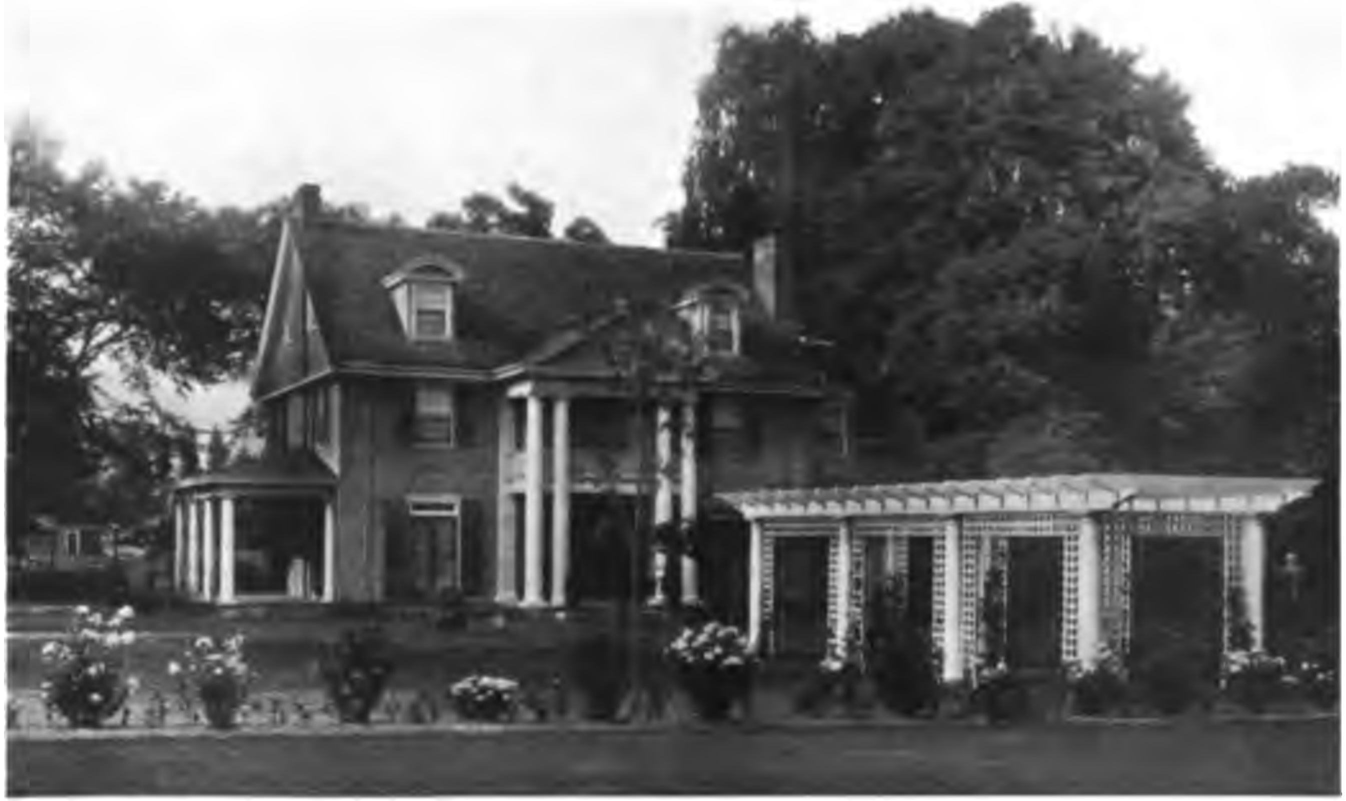
(A reproduction at small size of Portfolio Plate XLII.)



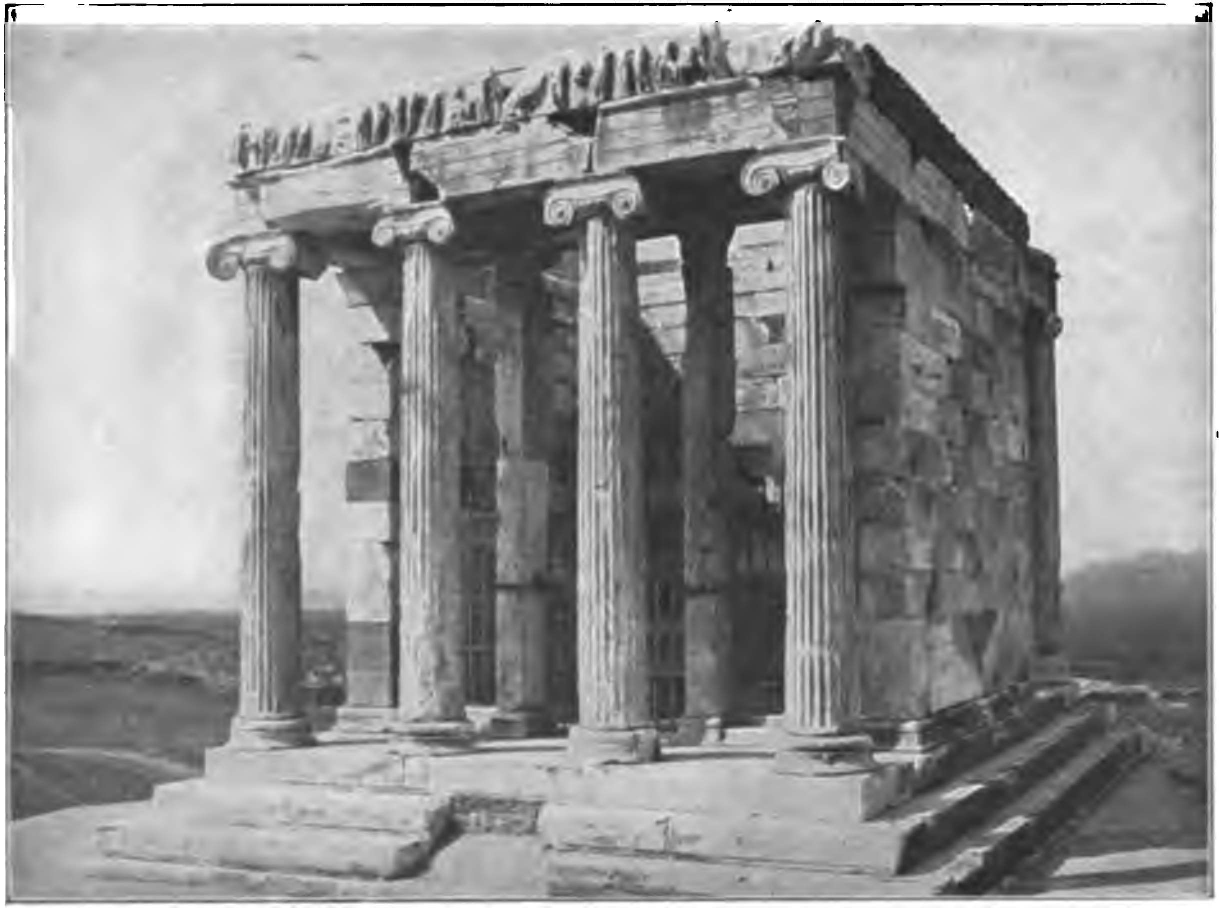
GRAND PALAIS, PARIS, FRANCE

Louvet, Deglane & Thomas, Architects.

Built in 1900. This Monumental Building Serves for Big Expositions of All Kinds.



RESIDENCE OF A. C. HEUBLEIN AT HARTFORD, CONNECTICUT
A. Raymond Ellis, Architect, Hartford, Connecticut
The view shows the garden, south portico and pergola



Temple of Niké Apteros on the Acropolis, Athens.
Showing use of Greek Ionic Column with Plain Capital and Ornamented Frieze.

one known as the plain and the other as the decorated or ornamented capital. The type of the plain capital is shown in Plate XLII, at a large size and with the necessary constructive measurements. This example was taken from the four-columned porch of the Temple of *Nikė Apteros*, or the Wingless Victory, on the Acropolis at Athens, and has been slightly changed from the original in one particular, by drawing in the volute eye of the capital slightly toward the center of the column from each side, thus doing away with a certain awkwardness in the extreme projection (when seen from the front) of the volutes in the original. This varia-

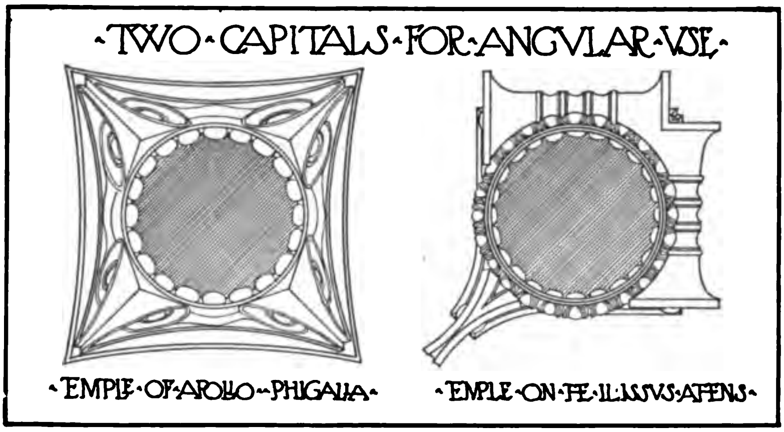

·TWO·CAPITALS·FOR·ANGULAR·USE·
·TEMPLE·OF·APOLLO·PHIGALIA·
·TEMPLE·ON·THE·ILISSUS·ATHENS·

Fig. 62. Examples of Doric Corner Capitals. (Section looking up.)

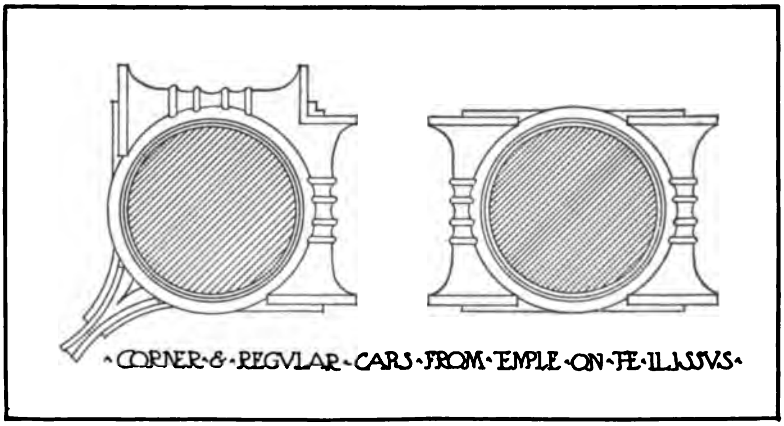


Fig. 63. Typical Ionic Corner and Regular Capitals. (Section looking up.)

tion is only of three parts, but it better fits the capital for more general use. The variety of the Attic base used in this example, is shown on the same plate. The roll or end of the volute, as shown in this plate, is extremely simple, even for this plain type of capital; and it is often decorated or carved with some simple leaf ornament, as is shown in Plate XLVI and Figs. 65 and 66.

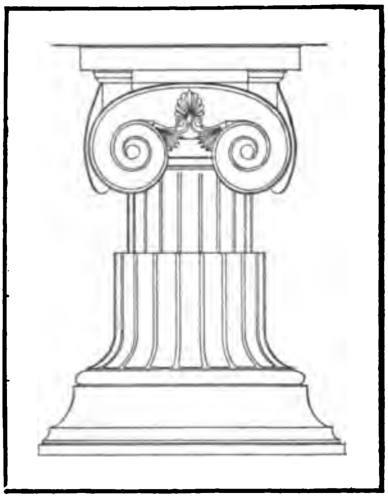


Fig. 64. Ionic Column from Temple of Apollo Epicurius at Phigalia.

The column used with the plain Greek Ionic capital is shorter in proportion than the example used with the ornamented capital from the Erechtheum. In the Temple on the Ilissus at Athens, the column in this instance being only about 14½ feet high, the form of capital and proportioning of column more nearly approach the type afterwards adopted as distinctively Roman. Other Greek variations of a similar form are those used in the Temple of Apollo Didymæus, near Miletus, and the Aqueduct of Hadrian at Athens (Fig. 65); and in the Temple of Minerva Polias at Priene, and the Ionic capital from Athens, shown together in the same illustration (Fig. 66). In these two plates the upper half of the plan belongs, in each instance, to the cap shown in one-half front and one-half end elevation above it, while the lower half of the plan belongs to the capital shown in the same manner below.

The Decorated Ionic Capital. The decorated capital has, in addition to the echinus moulding below the band forming the volutes and treated with an egg-and-dart, a frieze or necking carved with a honeysuckle ornament, separating the capital from the fluted shaft of the column, and defined at the bottom by an astragal moulding. This necking is elaborately carved with some such ornament as that shown on Plate XLIII, in which this capital is drawn out at a large size with constructional figures. This is the capital from the Portico of the Temple of Minerva Polias, or the North Porch of the Erechtheum

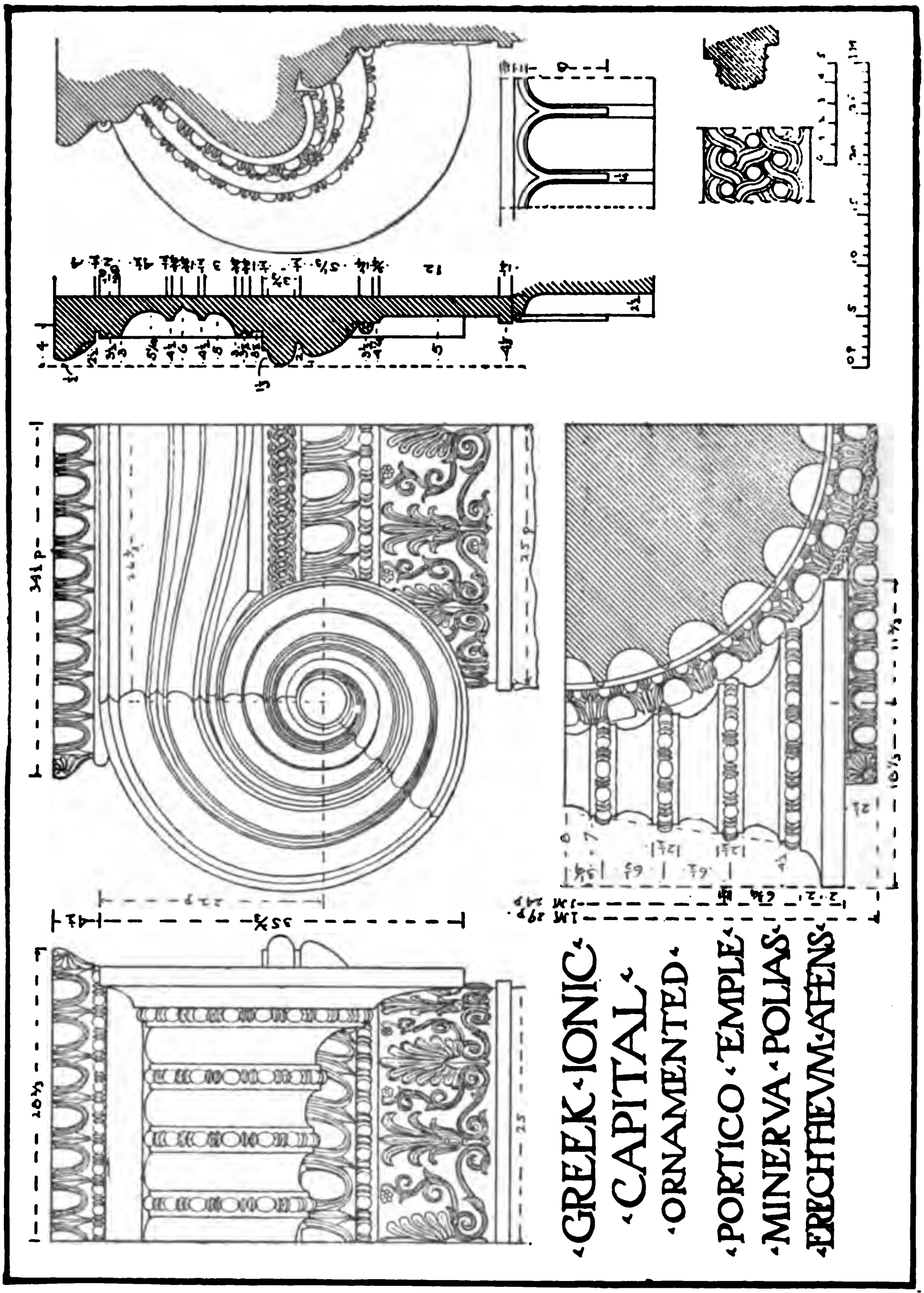
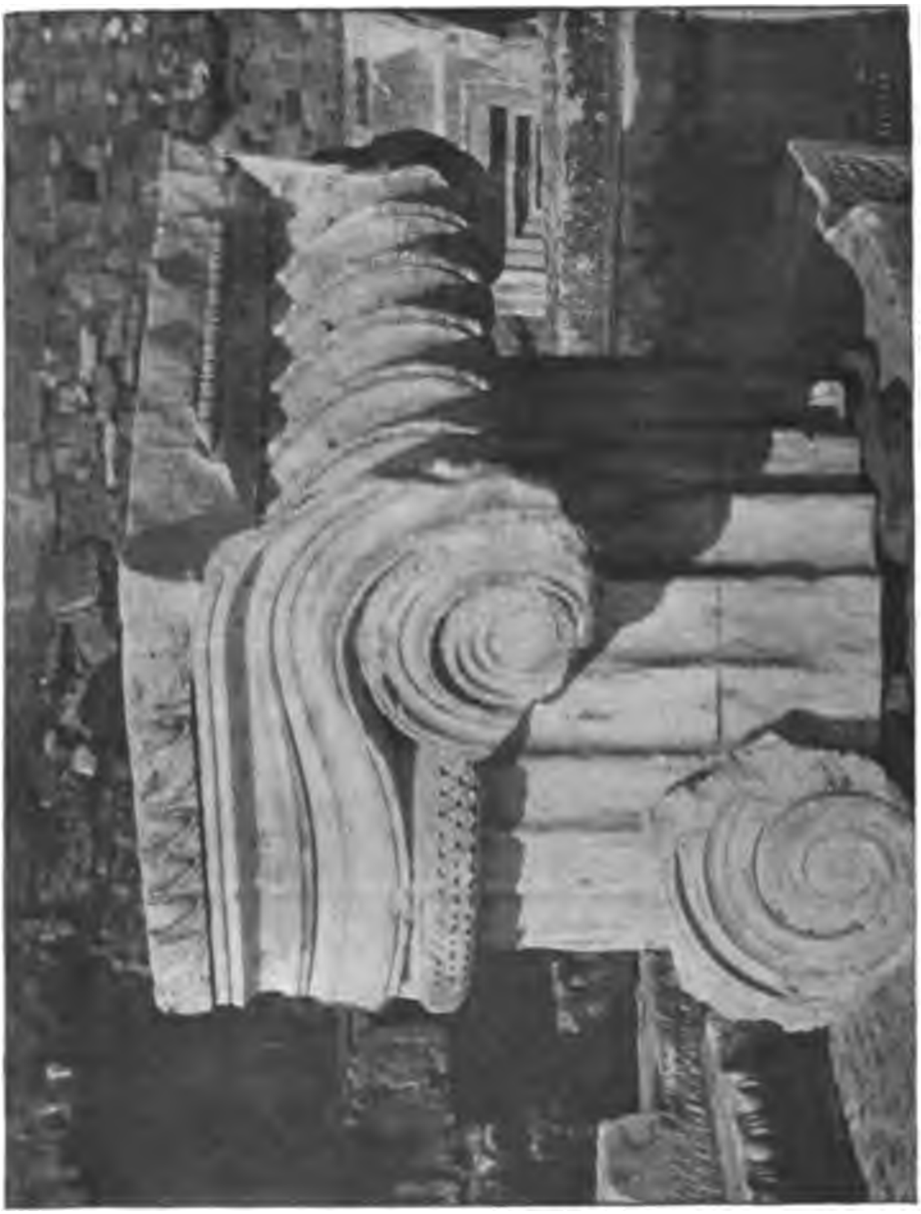


PLATE XLIII.

(A reproduction at small size of Portfolio Plate XLIII.)



Ornamented Greek Ionic Capital
From Erechtheum, Athens.

at Athens. This porch is shown at a large size in Plate XLIV. It is these columns which we have already mentioned as swelling out $\frac{1}{184}$ of their diameter before tapering to the neck. The doorway of this porch is drawn out more particularly in Figs. 83 and 84.

In the drawing of this capital in Plate XLIII, it will be noticed that the face of the volute is much more elaborately moulded than the simpler example shown in Plate XLII, and has in addition an entirely new set of members in the center of its flattened scotia, while all its parts are more elaborately and finely cut. An ornamental torus, which is not shown in other types of Greek Ionic capitals, also appears above the egg-and-dart and below the band moulding. The square abacus

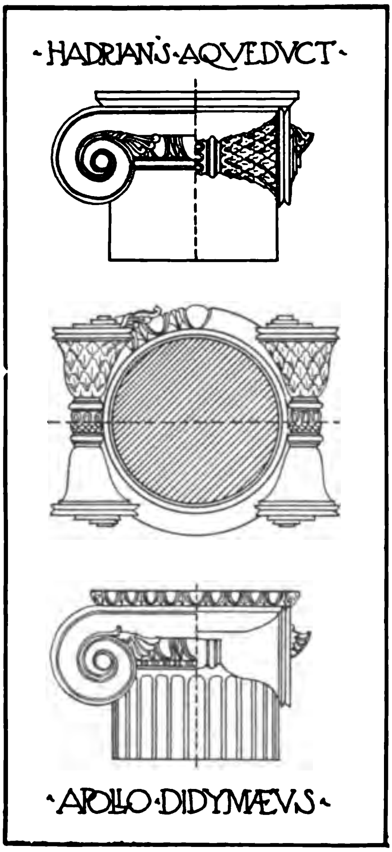


Fig. 65. Typical Decorations of Ionic Capital.

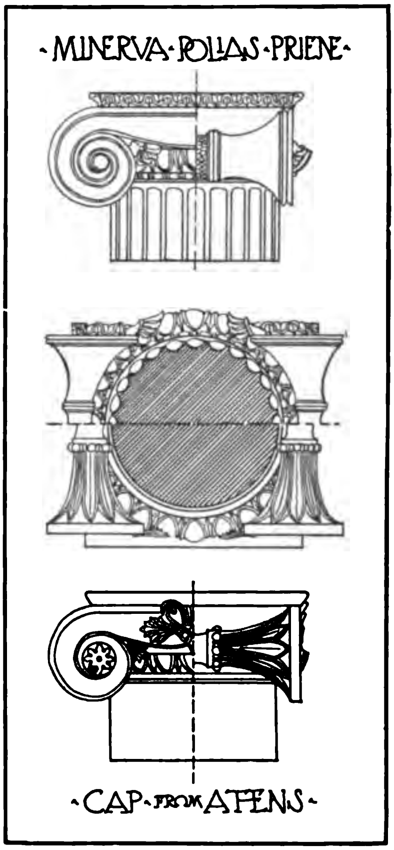


Fig. 66. Typical Decorations of Ionic Capital.

above the band of this capital is invariably carved in the ornamental type, while in the plain capital it is sometimes left unadorned. This capital, with necking, should be used only with a taller and more slender shaft than the other type requires.

The ornamented Ionic capital may be considered as the more distinctively Greek, inasmuch as the Romans, in adopting the Ionic column and its capital, followed out more closely the idea shown in the simpler type, while the Greeks themselves have proclaimed their partiality for the more decorated form by using it in the most elaborate single temple which they have left us, that of the Erechtheum.

General Type of Greek Ionic Order. By referring to plate XLI and Fig. 50, the description of this order can be better comprehended. The architrave produces an entirely different effect from the one used with the Doric Order, and, while left plain in some cases, it is ordinarily divided into two or three bands by small horizontal projections, and is crowned with various mouldings, often ornamented with the egg-and-dart or with reel and bead. The ordinary measure of the height of the architrave is about equal to three-fourths of the column diameter. The frieze, a little less high than the architrave, is, as before, crowned with ornate cornice mouldings. These friezes are merely plain surfaces, and in the Greek Orders are more often enriched by carving. If decorated, it is generally with bas-reliefs in the nature of a procession of some sort, continuing without interruption all around the entablature (Fig. 77). The cornice is simpler and even lighter in proportion than that of the Doric Order, on account of the added height of the column; while it is composed entirely of simple bands of mouldings. Indeed, throughout the entablature of this Order, it is the horizontal lines that are emphasized.

The Ionic cornice is less than one diameter in height, the corona projecting over the line of the frieze by a distance equivalent to the height of the cornice. It possesses an inclined soffit supported by a bed-mould composed of different members, sometimes ornamented with the egg-and-dart, and in late work often contains an additional course of dentils or brackets. It is surmounted by other mouldings and the cornice is ended by a cyma especially decorated with a honeysuckle ornament and with heads of lions serving as waterspouts. The mean height of the cornice is about one-quarter that of the whole en-

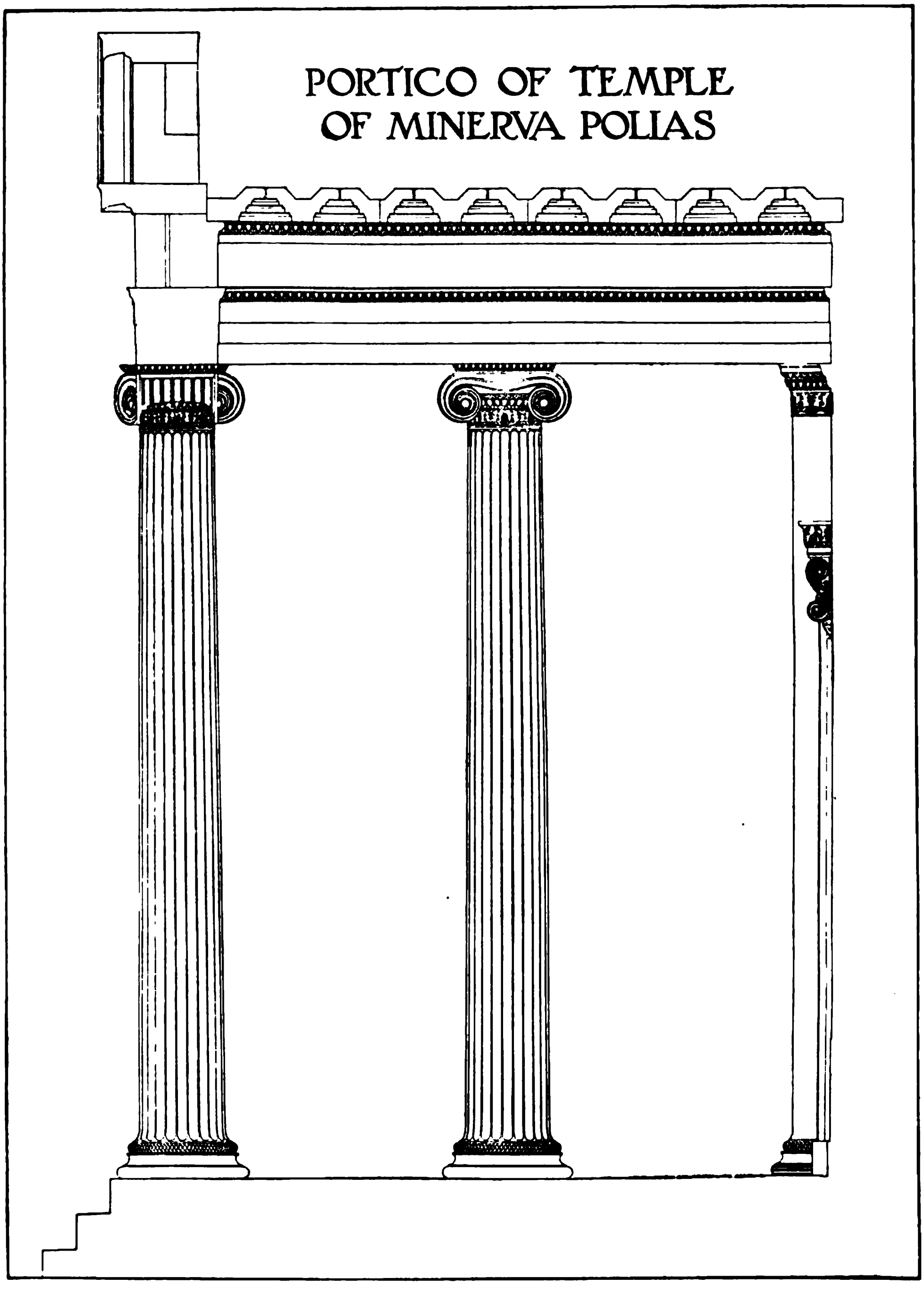


PLATE XLIV.

(A reproduction at small size of Portfolio Plate XLIV.)

tablature which bears a ratio to the height of the column of about 2 to 9, or a little more than two diameters.

The Erechtheum. The Erechtheum or Triple Temple at Athens is an exceptional plan in Greek work, and requires special explanation. This Triple Temple, situated on the north side of the Acropolis, was devoted to the worship of three separate deities. The principal front, a six-column porch, was termed the Temple of Erechtheus, and was connected through the passageway at the side (see plan, Fig. 67) with the Temple of Minerva Polias, which had its entrance or portico at the side towards the north. To this porch belongs the doorway that is separately described. Opposite this portico, on the south side of the building and facing towards the Parthenon, is the Tribune or Porch of the Caryatides, (Fig. 80) or the Temple of Pandrosus. The caryatides are placed on a very high stylobate, or basement, beautifully moulded and carved. It will be seen that the main body of the building itself, leaving out these north and south porches, follows the same simple plan whose development we have already traced; and it is only in viewing the exterior of the building (Fig. 68), that any confusion on this point might arise.

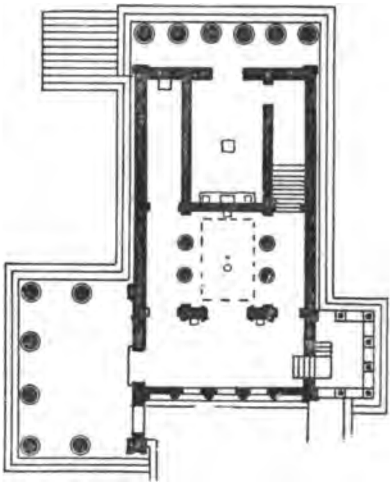


Fig. 67. Plan of Erechtheum.

There are no less than three different sets of columns of the Ionic Order employed on this building. The principal one is at the east end or front, with a subsidiary column of almost the same height on the porch of Minerva Polias, while the west or rear wall of the building is decorated with four attached Ionic columns of the same order *in antis*, these being of a still smaller size and having windows placed in the spaces between them. This building may be considered as the most pretentious and highly enriched example of Greek temple architecture; combining, as it does, the use of the graceful Ionic Order in what was to the Greeks its most ornamented and highest developed form, with the

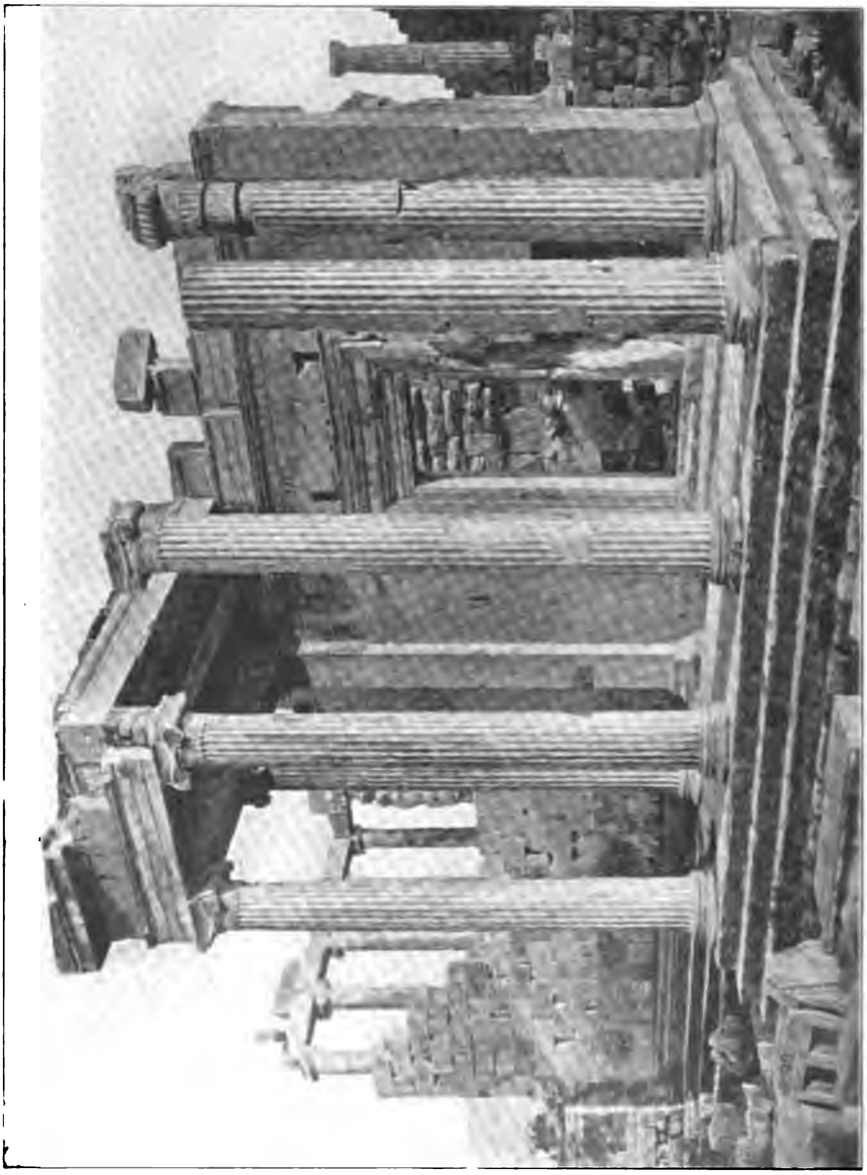


Fig. 68 General View of North Porch of Erechtheum, Athens

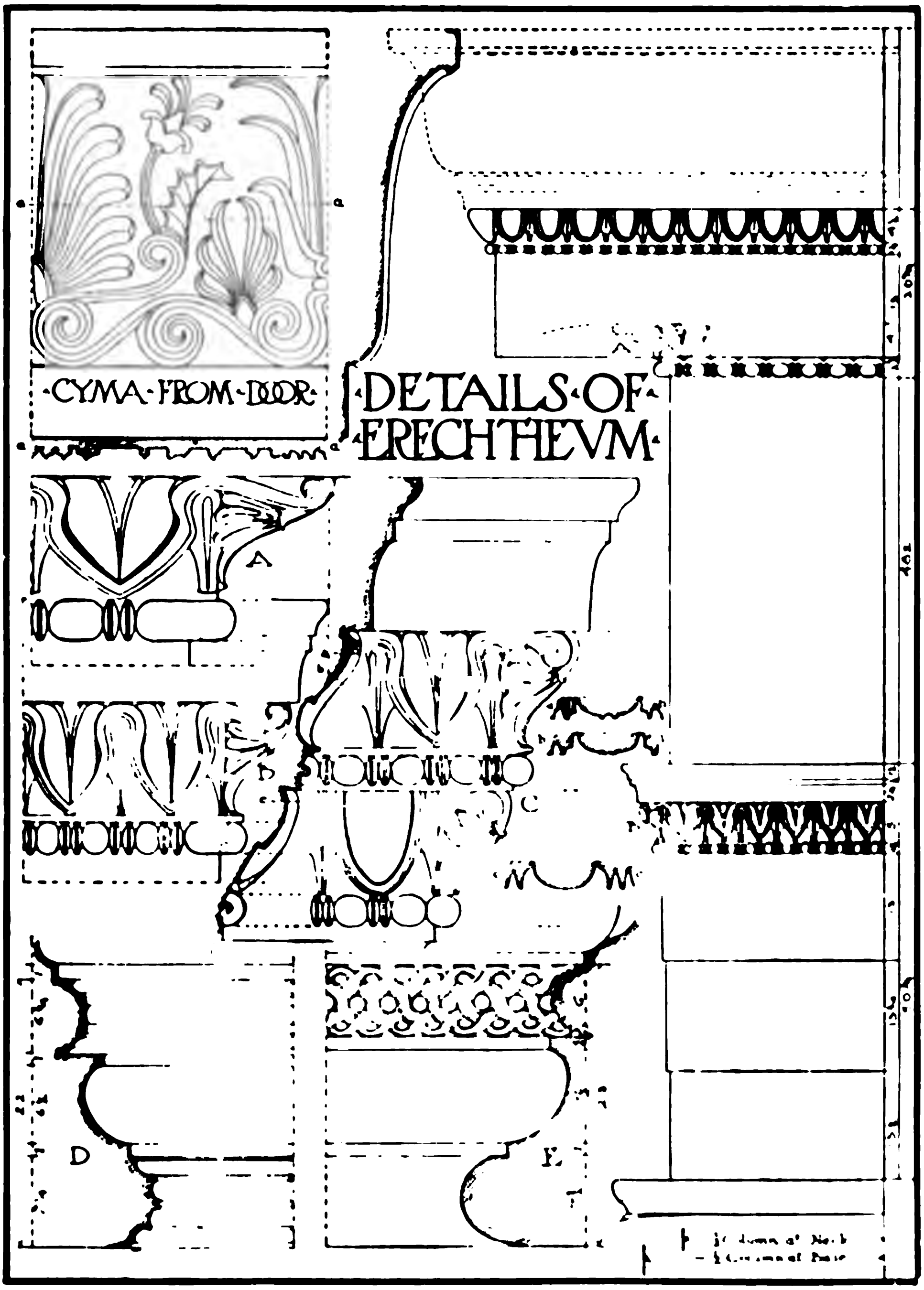


PLATE XLV.

(A reproduction at small size of Portfolio Plate XLV.)

addition of the beautiful and unique Porch of the Caryatides. The combination in one group of these three temples was evidently considered by their creators as a *tour de force;* while the way in which the portico to the Temple of Minerva Polias is arranged—so as to place its center on the axis of the door to this temple and still tie it in to the whole composition, even though it projects beyond the end of the body of the building—is a naive and most successfully natural solution of the problem.

We have already seen that this building, the Erechtheum, furnishes two, or more properly three, uses of the column of this Order. On the four-columned North Porch of the Temple of Minerva Polias (Fig. 68) and on the six-columned main entrance to the Temple of the Erechtheum at the east, very similar forms of the capital are employed. These two different columns, the first a little over twenty-five and the second a little over twenty-one feet in height, are placed under the same entablature, and should be accepted as the highest development of the ornamented Greek Ionic form. Besides this, a smaller column of the same type is used at the west end between the window openings, but attached to the wall behind it.

The entablature used with the decorated Ionic capital on the Erechtheum is shown in Plate XLV, where the beautiful proportions of its various horizontal parts and mouldings may be studied carefully. The use of carved or ornamented members in this cornice is especially notable, from the restraint employed in placing them at the exact points where this enriched line demarks most plainly the main horizontal divisions of the entablature and strengthens the more important shadows cast by the moulded sections. The carved bed-mould of the cornice, and the ornamented member of the crowning part of the architrave, are shown at a large size in A and B; while at C are given the carved members of the anta used with the column, the base of which is shown at D, opposite the enlarged section of the Attic base of the Erechtheum columns at E. This plate will indicate the great refinement and purity of the best type of ornamental Greek carved mouldings, and will also show how closely the character of the carving follows and emphasizes the contour of the moulded section itself.

Various Examples of the Ionic Order. There are many types of the Ionic Order where the capitals are of different characters, and a short description of each will be found necessary in order to comprehend, in even a rapid fashion, the character which is given to these designs and details, and the different elements that compose the most beautiful examples. At Athens, and particularly in the Temple of the Wingless Victory (Plate XLII), the mouldings forming the roll of the volute are divided and bent towards the axis of the capital. At Phigalia (Fig. 64), the volutes, being larger and simpler and with much projection, are rejoined to each other about the axis. In Asia Minor, the volutes are in general relieved by absolutely horizontal mouldings (Fig. 65). These three general types will show the variety of the different capitals used in the Greek Ionic Order. In the old examples the volutes were given more projection, and afterwards apparently reduced on account of exigencies of construction. They are also more developed or refined in treatment in later Orders, and the eye of the volute is ordinarily placed in plane with the line of the shaft. It is not very late in Italy when the eyes of the volutes are placed still nearer each other, and we find them coming even inside of this line.

Temple of Minerva Polias at Priene. There is a rather individual form of Greek Ionic Order employed in the Temple of Minerva Polias at Priene, which has been drawn out in Plate XLVI. The base of this Order we have already mentioned, but the capital is unlike any example we have yet seen. It is a version of the simple or plain Greek Ionic, but the designer was not satisfied by showing one-half of his volute on the internal angle of the capital, as in the corner capital from the Temple on the Ilissus at Athens, shown in plan in Fig. 62, which should be compared with the plan of the capital on this plate. It will be noticed that in order to show the complete volute in this angle it was necessary to throw out the roll at the back of the capital, opening the space between it and the ornamented egg-and-dart of the echinus moulding which follows in plan the circular shape of the shaft. This would produce a certain awkwardness of the soffit, seen when looking up at the capital from the inside of the porch, which would seemingly offset the advantage gained by completing the circle of the two volutes shown on this internal angle. It also necessitates the peculiar shape of abacus on that corner, completed in plan in Plate XLVI by the dotted lines. To be sure, this is much more logical in itself than breaking out the abacus on the opposite exterior angle over the corner volute; but it is questionable if the effects in elevation

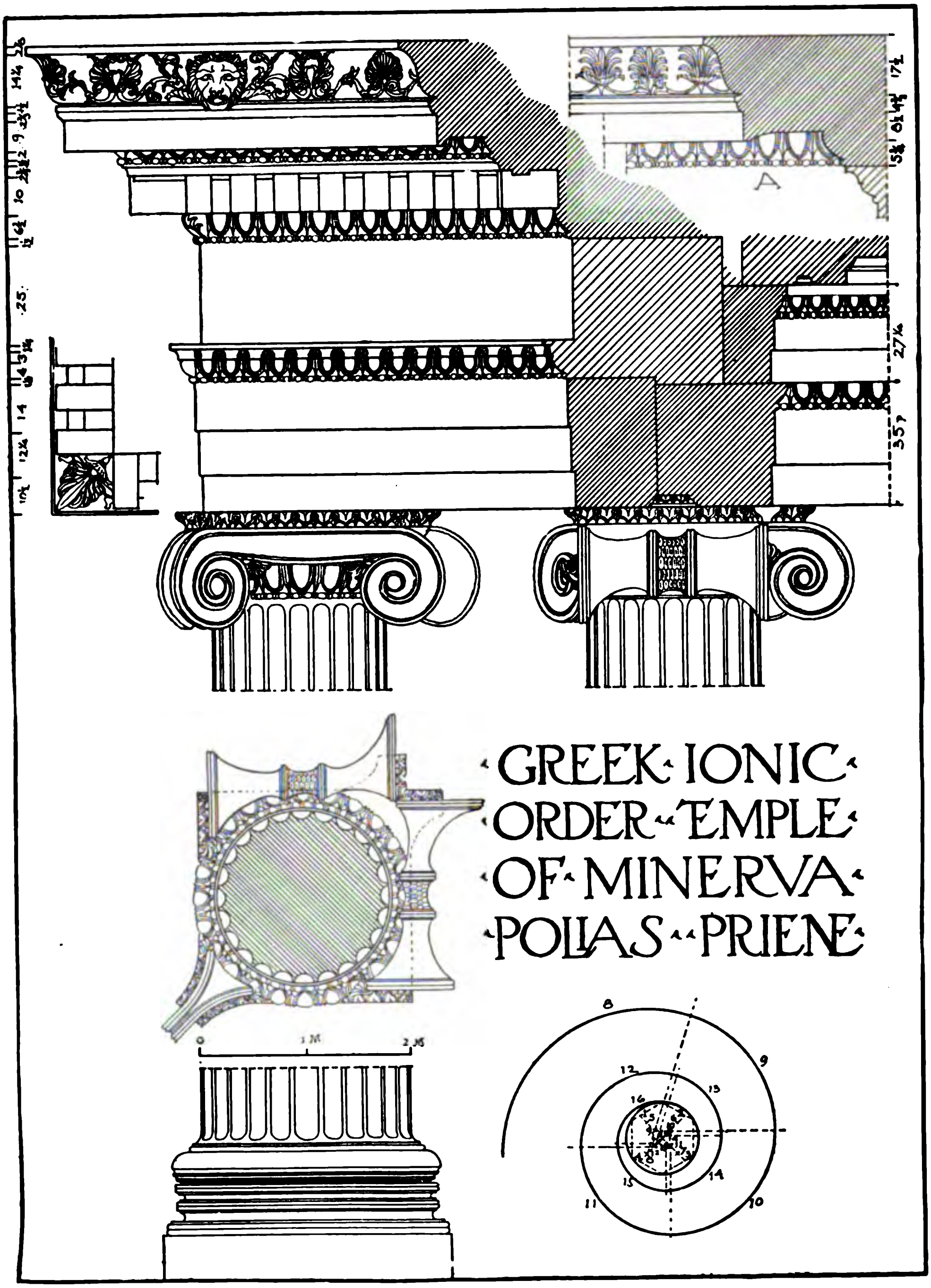


PLATE XLVI.

(A reproduction at small size of Portfolio Plate XLVI.)

shown in the capital immediately above the plan would be as happy or natural as in the other method, shown in the example from the Temple on the Ilissus already mentioned.

The entablature of the Temple of Minerva Polias at Priene is more elaborate than that shown in the Order on Plate XLI, and more nearly approaches the later Roman form. We see here an instance of the use of a dentil course in the bed-mould of the cornice, which partakes somewhat, by its extreme projection, of the nature of the console or bracket, and which may have given to the Romans the idea they afterwards developed. The treatment of the soffit shown in the small plan below is very similar to that between the corner mutules of the Greek Doric building. The cornice and crowning mouldings, shown at the right-hand upper corner of this plate at A, are taken from the gable or pediment of the building. This plate further shows the ornamented soffit of the architrave in the section through the entablature given at the right, which contains a small sunk panel ornamented with a carved moulding, this panel, however, being very narrow. In the sections shown on this plate, the stones hatched with a lighter line are restored and conjectural.

Another authority shows this Order without the frieze, and places the brackets or dentils directly upon the crowning member of the architrave. A method for determining the centers required to draw out the volute of the Greek Ionic capital, is shown in the lower right-hand corner of the plate.

CORINTHIAN ORDER

The Greeks invented, besides those already mentioned, another Order—the Corinthian. In the early examples of this Order which remain, we see evidences of the same processes of experimentation as tended to the development of the Doric Order, although it remained for the later Romans to give this type its most definite character. These Orders may be considered as successive steps in enriching and refining the effect of the column and entablature, along with their accompanying mouldings.

The Corinthian Order is distinguished from the other Orders by its principal characteristic, the capital, which is formed of two rows of acanthus leaves placed against a round vase or bracket, and which, with the abacus supported on the angles by volutes, is radically different from anything we have before seen.

Origin of the Corinthian Order. As the importation from other countries of the ideas on which the two first Greek Orders, especially the Doric, were founded, has been fairly proved, it seems less unreasonable to believe that the idea of the Corinthian capital was also taken from Egypt, although the Greeks attribute its invention to an artist of their own country, Callimachus, an architect, painter, and sculptor, who exercised his art about the year 437 B. C.

Vitruvius tells a legend or story of the invention of the Corinthian capital. A young girl of Corinth having died, her nurse placed in the tomb a bracket on which were set objects most dear to her mistress, and for protection from the rain she also placed a large tile over the bracket. A wild acanthus, whose roots were underneath the offering, spread its leaves around the outline until the tile curved their tops over and outward. Callimachus, finding the forms produced by this happening most decorative, applied them to his creation of a new Order of architecture.

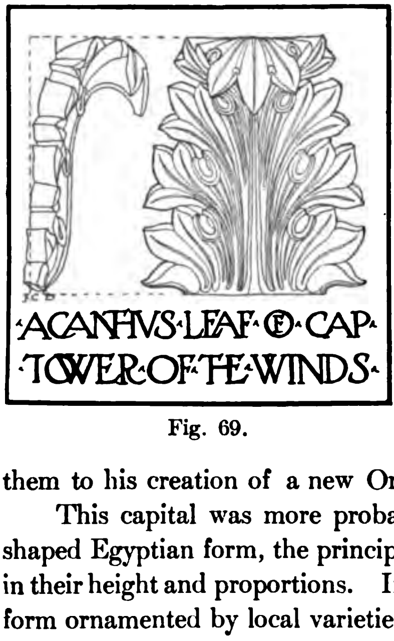
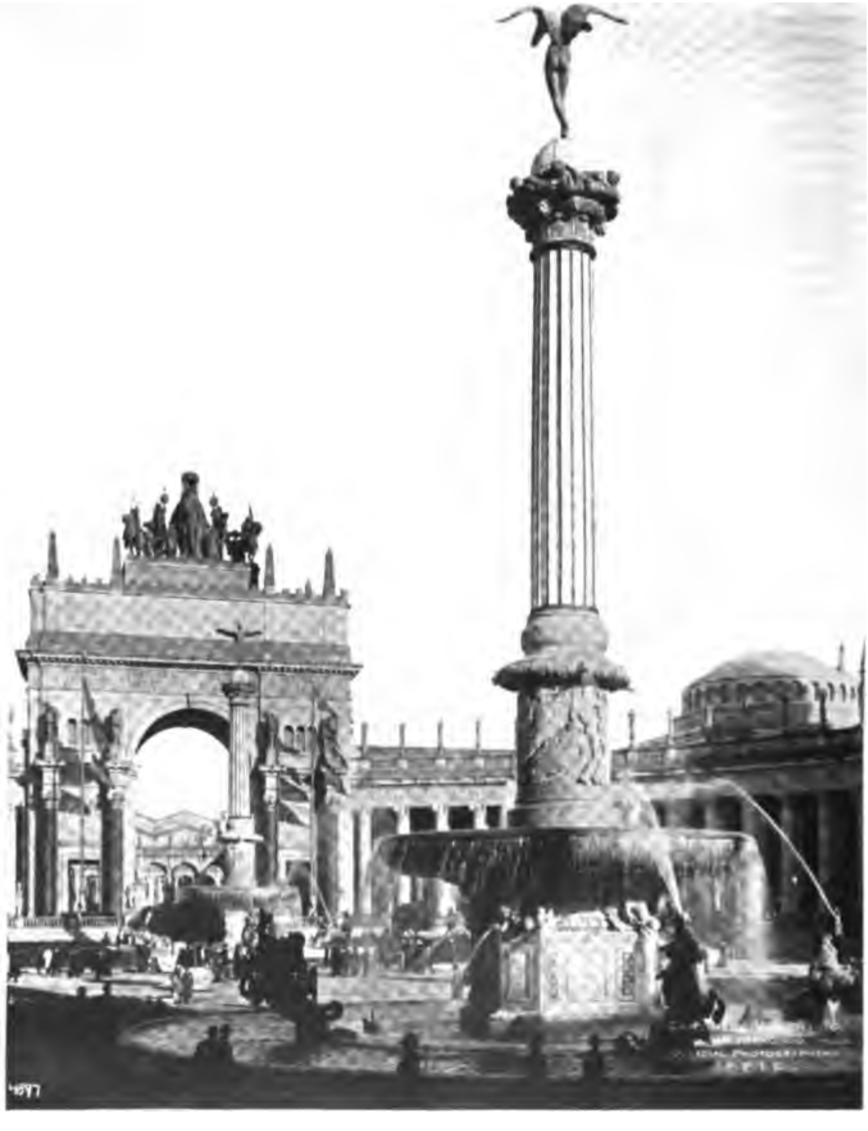


Fig. 69.

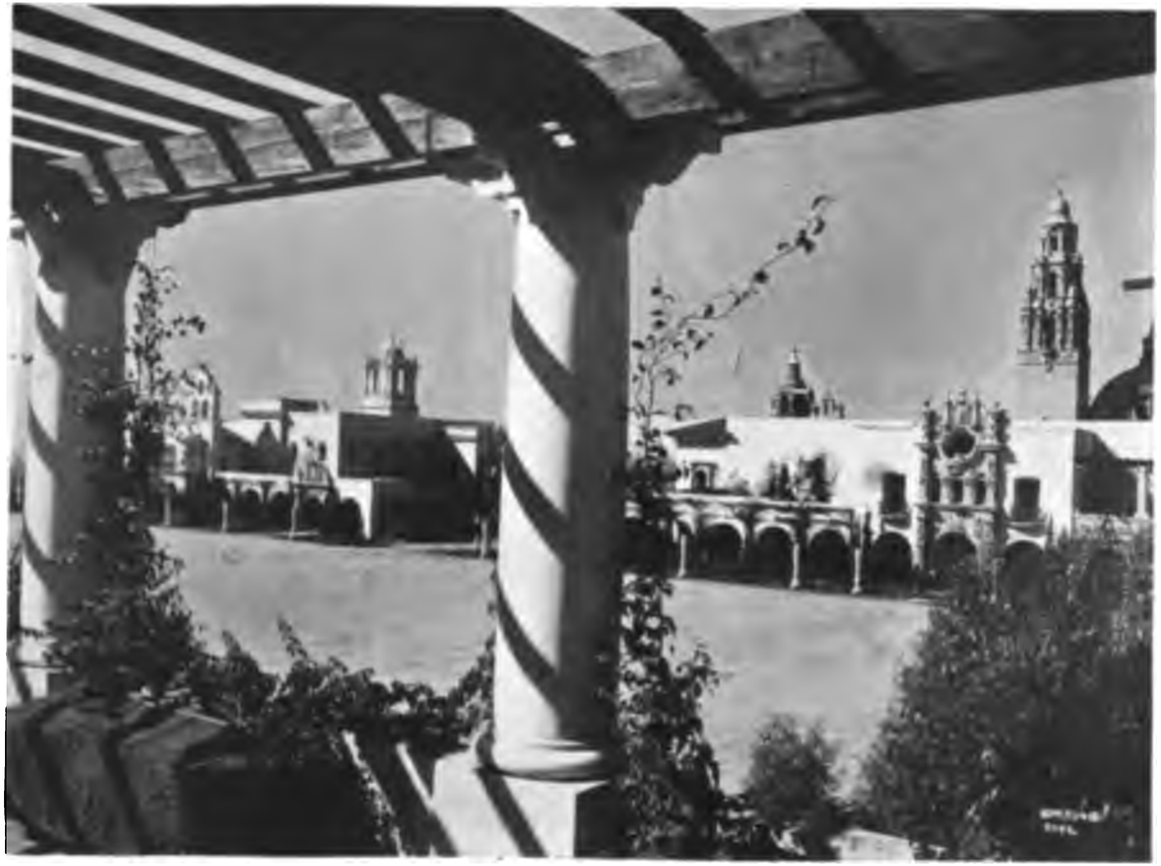
This capital was more probably developed from the lotus bell-shaped Egyptian form, the principal difference between the two being in their height and proportions. In both we have a simple bell-shaped form ornamented by local varieties of leafage, the one taken from the lotus plant, and the other from the more spiny acanthus.

In the Temple of the Winds, the capital shows a combination of what is known as the "water leaf" with Greek acanthus leaves covering the lower portion of the capital and superposed upon their face. This water leaf suggests to a considerable extent the form of lotus used by the Egyptians in the capitals of some of their columns. The derivation of the spinals or volutes, used as they are on the angles of this capital, is not so obvious.

It has also been suggested that this form of capital came from



FOUNTAIN OF THE SETTING SUN AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION, WITH THE GREAT ARCH OF THE RISING SUN IN THE LEFT BACKGROUND



PLAZA DE PANAMA FROM AN OVERHANGING BALCONY, PANAMA-CALIFORNIA EXPOSITION AT SAN DIEGO, CALIFORNIA

the custom of ornamenting, on gala occasions, the capitals of the Ionic column with flowers and foliage, which we know were often festooned and draped between and around these columns. It is more probable, however, that this capital may have been suggested by the decorated Greek Ionic form; the decoration with leafage of the bell-shaped portion being merely an exaggeration of the decorated necking employed in some examples of the use of the Ionic Order. The leaves in the capital are frequently drawn in the conventional outline manner shown in Plate XLVII, merely for ease in rendering; but they should actually be treated after the spiny fashion of the acanthus leaf, shown in Fig. 69.

Fundamental Rule to be Observed in Making the Corinthian Capital. It is most important, in order to obtain the best effect with the Corinthian capital, that the leafage and growth of the leaves, and the form of the bell, should follow sharply and continue the outline of the column shaft up to the point where they are allowed to curve off under the volutes and abacus of the capital. This curve in itself should be carefully arranged so that its outline will suggest the firm support that is essential in order to obtain the best effect. If the leaves project beyond the line of the shaft at the bottom of the capital, the outline is bulging, unnatural, and most unpleasant to the eye.

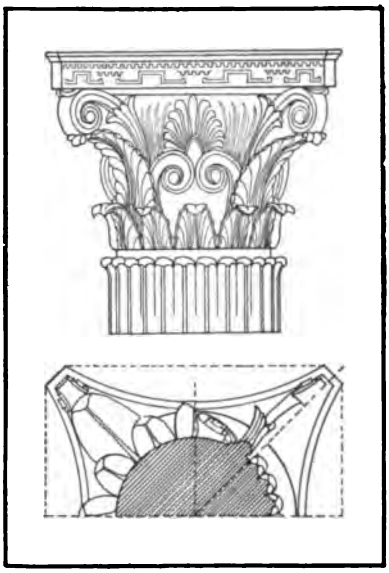


Fig. 70. Capital from Temple of Apollo at Phigalia.

Examples of Corinthian Capitals. The Corinthian order offers in Greece but a very small number of different types. We find that Ictinus used this order in the Temple of Apollo at Bassæ or Phigalia about 431 B. C., for one isolated column placed between two shafts of the Ionic order; and therefore this instance, except for the interest given by the details of the capital, is of little value. The abacus of this capital, with its wide, plain face ornamented with a geometrical design picked out in color, is very crude in treatment; and the fluting ends at the neck—as will be seen by referring to Fig. 70—in a manner similar to that on the column of the Monument of Lysicrates. The capital from the Temple of Apollo Didymæus at Miletus, an Ionic temple, is shown in Fig. 71, and is a much more refined example of a very similar Corinthian treatment, but showing that a more definite form is here assumed. In this example, the rather peculiar treatment of the abacus on the four corner angles should be noted. We also find that the Corinthian Order was employed upon the half-columns attached to the interior wall of the Philippeion at Olympia, of the date of 338 B. C.

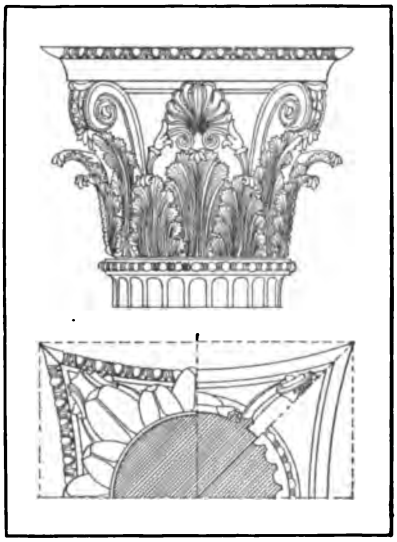
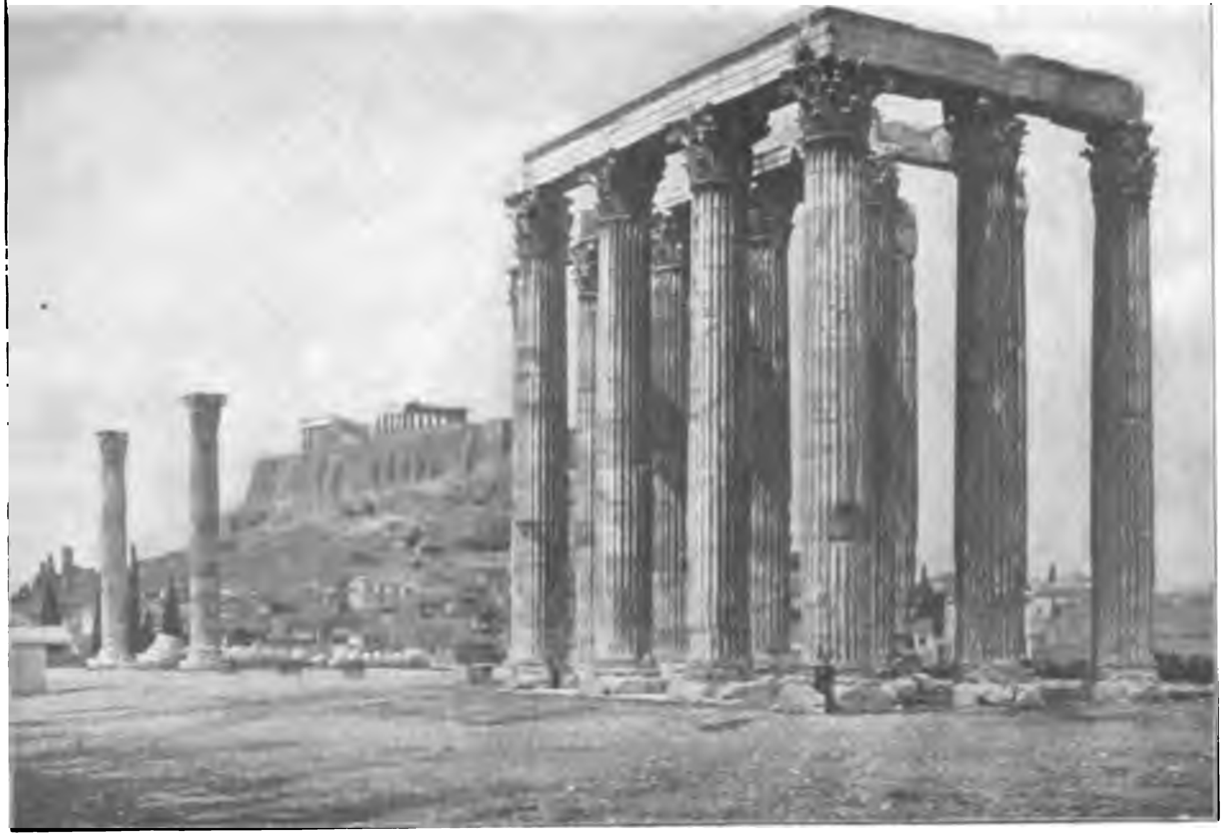


Fig. 71. Capital from Temple of Apollo Didymæus, Miletus.

Besides these Greek uses of the Corinthian capital, two of which are shown in both plan and elevation in Figs. 70 and 71, there are but three others, and these all well known and more perfect, if widely different, examples—the Choragic Monument of Lysicrates at Athens, B. C. 335; the column from the porch of the Tower of the Winds, B. C. 100-35; and, the most perfect of all, that of the Tholos at Epidauros, belonging to the 4th century B. C., and attributed to Polycleitus the younger. This capital, while the most perfect, is also the earliest known example of the Corinthian column employed under an entablature.

The Order used in the magnificent Temple of Zeus at Athens, while Greek in design, was finished under the influence of the Roman occupancy of Greece, being completed by Hadrian in 117 A. D., and is in many ways more closely allied with the later form of the Corinthian capital as developed by the Romans than it is with any of the pure Greek examples, with the possible exception of the one at Epidauros.

The Corinthian Order was left in a very undeveloped state by the Greeks, and the three instances just named are the only ones that may be considered as presenting it in anywhere near a complete and definite



Remains of Corinthian Temple of Zeus, Athens
With Distant View of the Acropolis

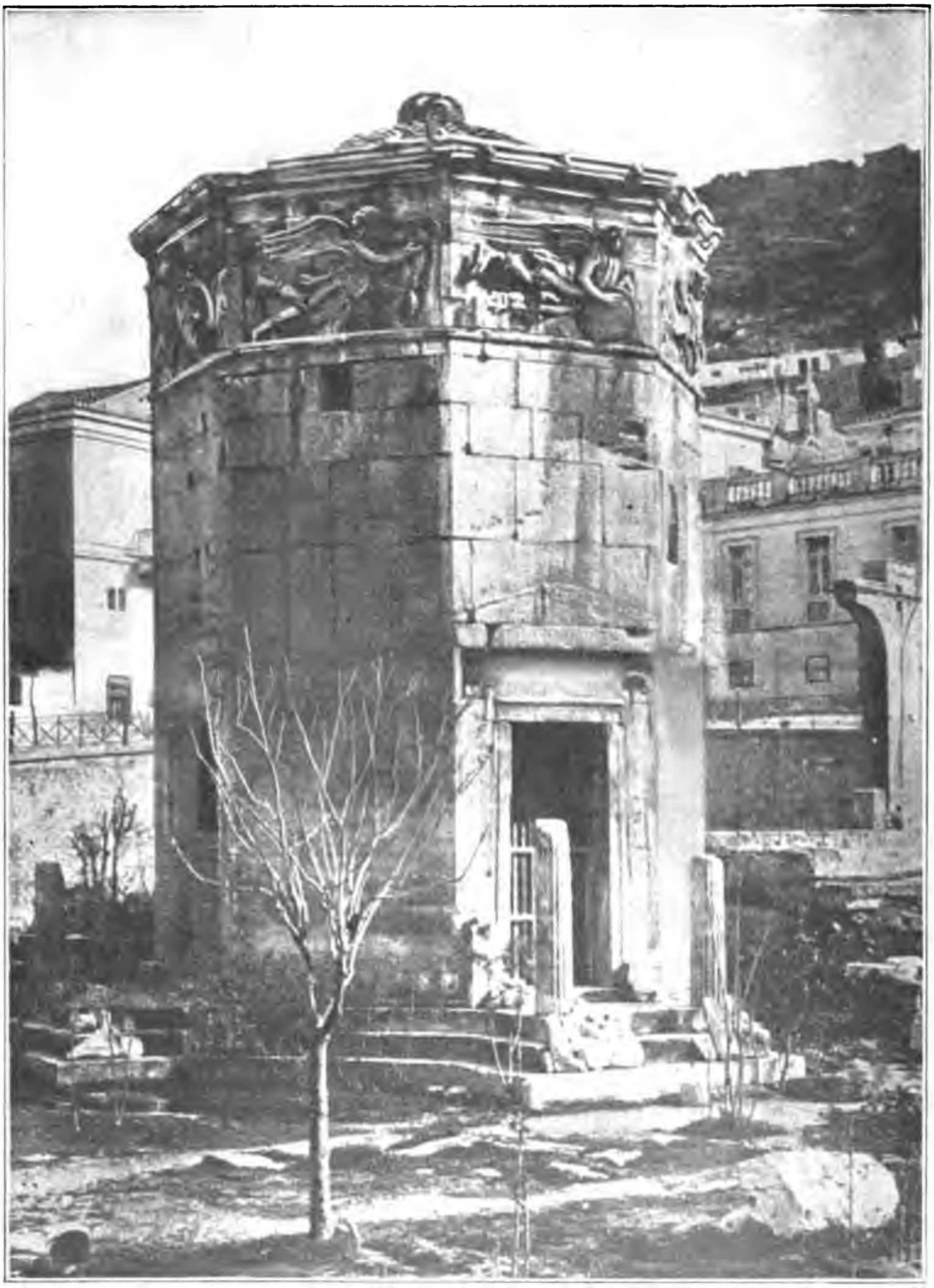


Fig. 72. Tower of the Winds, Athens.

form. The columns of these three examples are shown at their full height in Plate XLVIII, where they are arranged so as to be easily compared for the differences in the proportions of the shafts and their entasis, as well as for the purpose of contrasting the different Greek types of the capital itself. In all three, the shaft of the column is fluted; and in only one—that of the Temple of the Winds—is it left without a base, the other two showing a variation of the "Attic" base. These Orders must be separately described, inasmuch as there are certain peculiarities in each that may be attributed in part to the individual requirements of the separate problems involved.

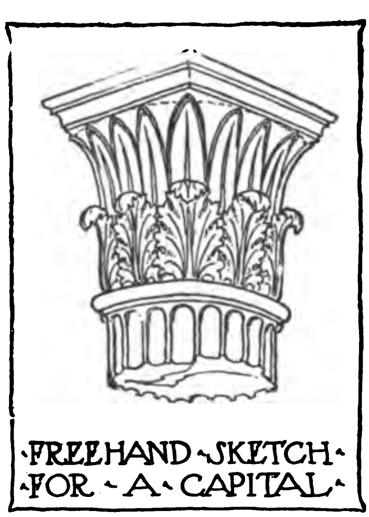


Fig. 73. Corinthian Capital from Tower of the Winds.

Tower of the Winds. The curious specimen of the Corinthian Order offered by the variation used on the Tower of the Winds at Athens (Fig. 72), is well worthy of study. The column, while of the three examples just mentioned the latest in date, is still the crudest in form, the other two being much more refined and graceful in type. In entasis, and in treatment of shaft and base, it follows very closely the Greek Doric method, beginning to taper from the start, as is elsewhere more fully shown in describing the entasis of that Order, and with the flutes running directly down into the platform on which it is set; but the shaft is itself more slender, being eight and one-quarter diameters in height, including the capital. Besides the column shown in Plate XLVIII, a perspective of the capital is shown in Fig. 73, while the interesting acanthus leaf embellishing it is drawn out at a larger scale in Fig. 69. Fig. 74 displays the entire tower, along with the unusual porch usage of the columns, the first Classic instance of their employment after this modern fashion.

Choragic Monument of Lysicrates. The details given in Plate XLIX are taken from the Choragic Monument of Lysicrates at Athens, an example of the purest Greek art, and the most interesting which we can find of a Corinthian order employed on an exterior.

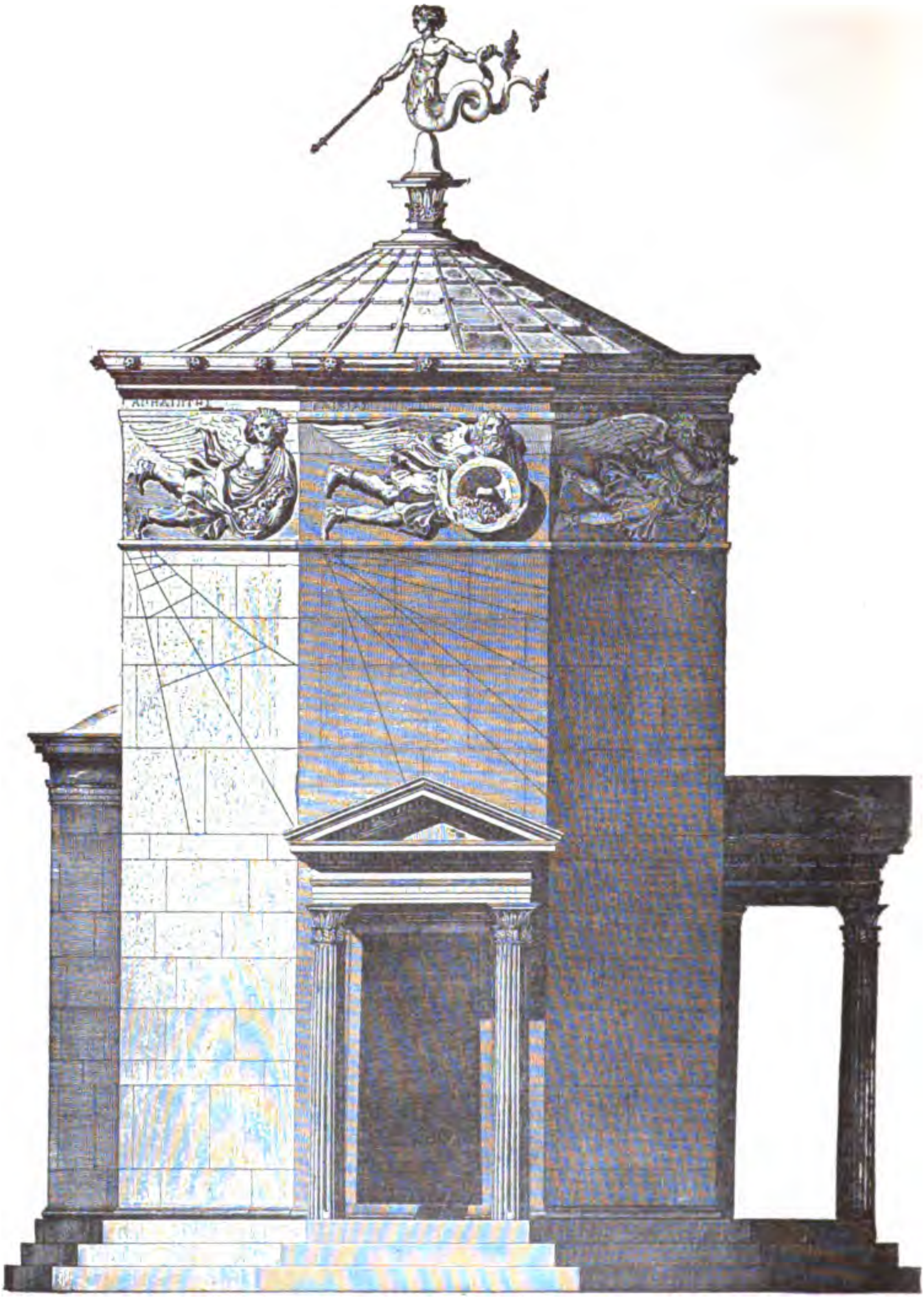


Fig. 74. Restoration of Tower of the Winds, Athens.

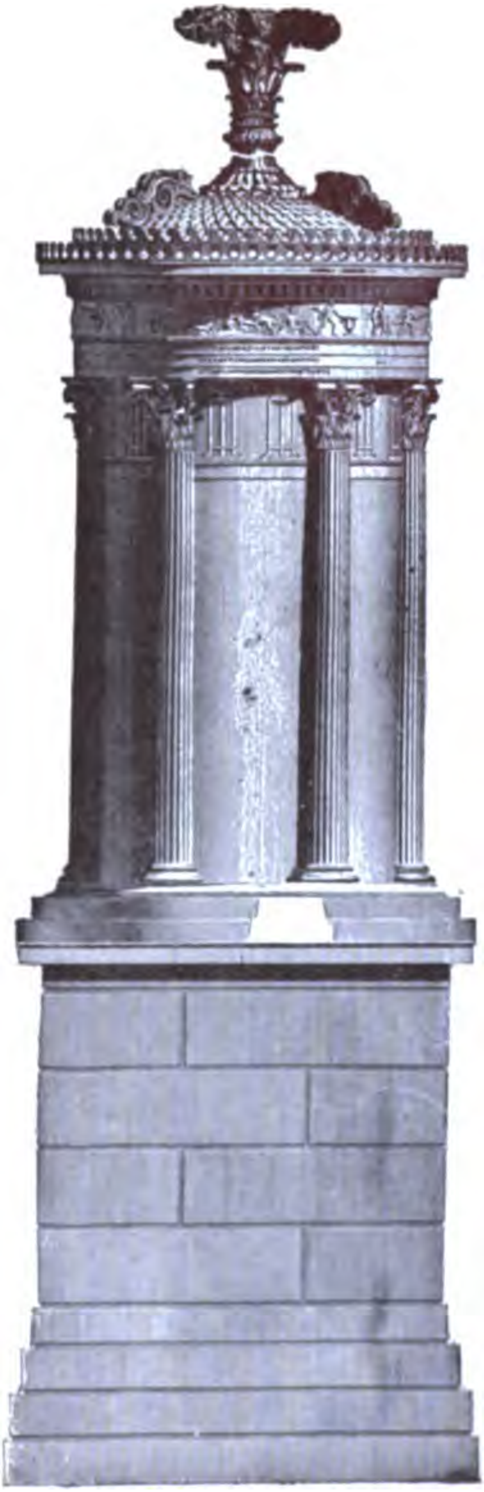


Fig. 75 Choragic Monument of Lysicrates, Athens. Restored.

The circular monument which we call the Choragic Monument of Lysicrates is better displayed in its entirety in Figs. 75 and 76. There are three steps, each of very slight projection, at the base of this monument, in addition to those shown. This may hardly be considered as a wholly satisfactory instance of the Greek use of the Corinthian Order, although it is the most perfect extant example. However, the columns—attached as they are to a blank wall, more after the fashion

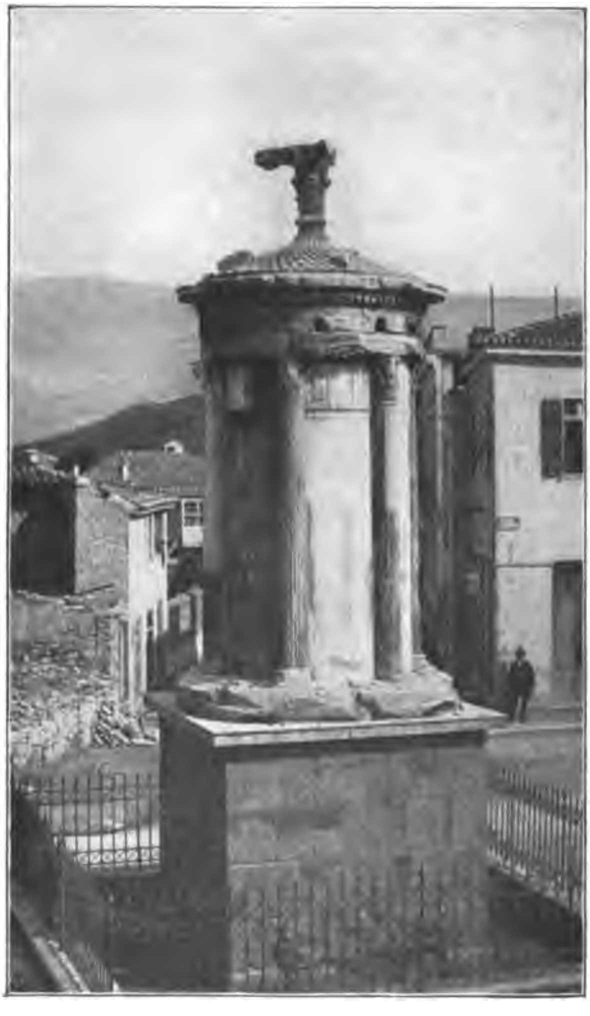


Fig. 76. Choragic Monument of Lysicrates.

which the Romans afterward adopted in their Orders—the circular plan, and the small scale—the tower itself being only about seven feet in diameter—render it very imperfect for our purpose, considering it from any standpoint. The details of this monument are better shown in Plate XLIX, where the detail of the capital may be studied with more particularity. The entablature follows closely the type shown in Fig. 50, and includes a course of dentils, but lacks the crowning cymatium of the Order Plate, its place being taken by a course of acroteria, forming a "chencau" or cresting around the top of the crowning member. The three fascias or faces of the architrave, as shown on the corner, are treated in a rather suggestive and unusual fashion. The beautiful and richly foliated crowning ornament of the monument is shown on this plate at a larger size, while the graceful acanthus ornament flowing down the roof and leading up to this central feature is shown in direct elevation as well as in plan and section. The "running dog" or wave ornament placed on the roof above and inside of the course of acroteria, is also shown in detail.

This monument was probably crowned with the emblematic tripod of the Choragus, executed in metal (the tripod is repeated in the wall frieze), and with one or two human figures, while the entablature frieze was ornamented in the fashion shown in the restoration (Fig. 77). The column in the Monument of Lysicrates has twenty-four flutes; its height is about eleven and one-half feet, and it is a little more than ten times its diameter, the capital being one and two-tenths diameters in height. The entablature is a little less than one-fifth the total height of this Order, while the base in this particular example is evidently so much influenced by its connection with the blank wall behind, that it can hardly be considered as typical, although it varies but little from that shown in the Corinthian Order Plate. The column is set upon a continuous base or step with a moulded, retreating face which is evidently intended to offset the projection of the belt course beneath. The shaft of this column is tapered more nearly after the Roman fashion, inasmuch as, before the entasis begins, it is straight for some distance above the base moulding.

The Tholos at Epidauros. In Plate L both the exterior and interior treatment of the Tholos at Fpidauros are shown in detail. We again find that this instance of the use of the Corinthian Orders must be taken as a most beautiful and individual example. The treatment of the entire entablature is evidently strongly influenced by its location on the interior of the building. While the architrave has not been varied much from the usual type, the frieze is shown as a delicate ogee moulding, and the crowning member or cornice partakes more of the nature of the dado or pedestal cap which we afterwards find used by the Romans, than the usual entablature-cornice. This column, as well as that of Lysicrates, has twenty-four flutes separated from each other by the now customary fillet, and is eight and one-half diameters in height; the capital being exactly one diameter high, above the top of the astragal moulding.

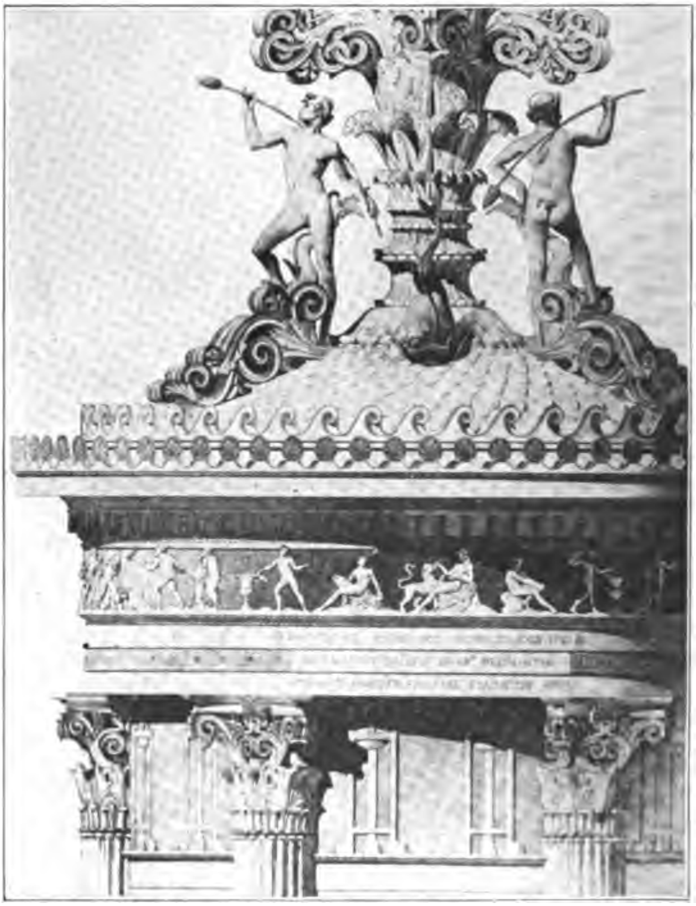


Fig. 77. Choragic Monument of Lysicrates, Athens. Upper Part Restored.

Not the least interesting part of this building is the form of the Greek Doric Order which we find here used. Belonging to this late period, it may perhaps be considered as a refinement upon this Order, even as used in the Parthenon. It is certainly quite as refined an instance, while the ornamented and less severe character which it is here given is commendable, considering the use of the columns on a building of circular plan (Fig. 78). The crowning cheneau (Plate L), with the lion's head for the waterspout, is unusually beautiful; while the Greek fret, used both here and on the interior entablature of the building, is the form to which the Greeks themselves are most partial and which they evidently considered as the most interesting development of this purely geometrical ornament to which they had attained. The carving of the separate members, from the interior entablature, shown in detail on this same plate, is exceptionally beautiful and pure in its type; while the running dog, taken from the panel in the soffit of the ambulatory between the Corinthian columns and the wall of the building, is especially interesting in its sectional treatment.

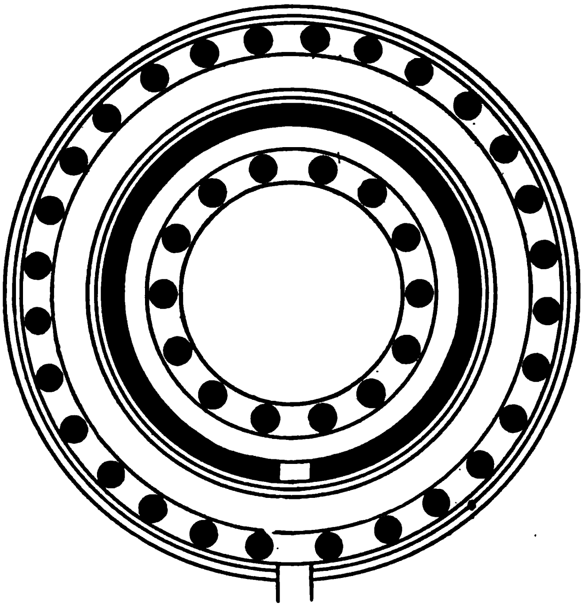
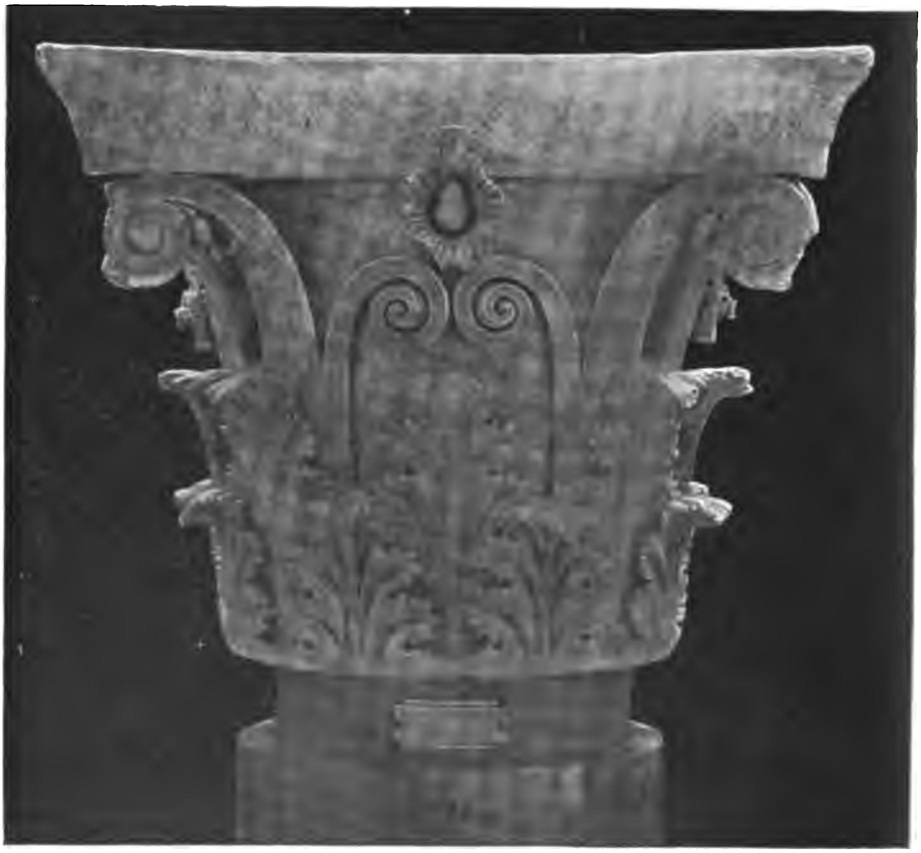


Fig. 78. Plan of the Tholos at Epidauros.

The column here employed is higher than in the earlier examples, being ten diameters in height; but it will be observed that most of this



Greek Corinthian Capital.
From the Tholos, Epidauros

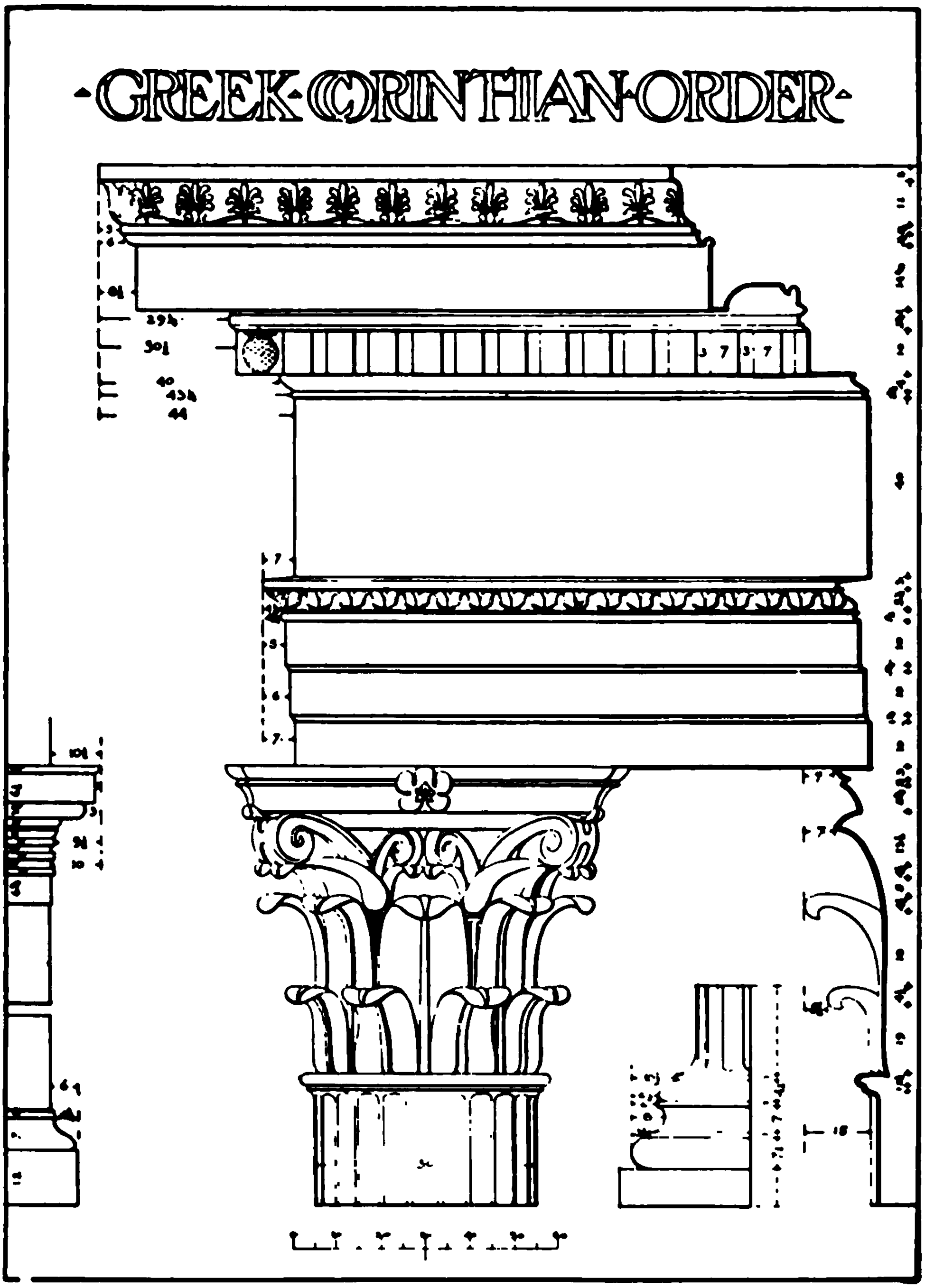


Fig. 79.
PLATE XLVII.
(A reproduction at small size of Portfolio Plate XLVII.)

additional height is taken up by the capital itself, while the height of the shaft remains practically the same.

General Type of Corinthian Order. The shaft of the Corinthian column is grooved with twenty-four channels, the same in number and in shape as those which ornament the Ionic column. The base is also the same; and it is the elevation of the capital, with its drawn-out narrow form, that adds apparent height to the shaft and makes the Corinthian column appear more elegant.

The height of the Corinthian entablature is two diameters and one-half, the diameter being, as always, taken at the bottom of the shaft. These proportions, although generally admitted, are not invariable; but they may be considered as a mean, founded on the examples of which we know, although they are admittedly very few in number.

The entablature differs but slightly from the one we have already seen on the Ionic Order in the Temple of Minerva Polias at Priene, shown in Plate XLVI; and a comparison of this example with Plate XLVII will show what slight change has been made from this cornice in its general proportions.

The architrave is divided into three bands or fascias, and the frieze is plain, or is ornamented with detached figures sculptured after a naturalistic fashion.

The proportions of the cornice to the entire entablature are somewhat changed from the typical Ionic form, as it is heavier and more in the relation to the whole that it afterwards bore in Roman work. The dentil, which first appeared in the Ionic cornice, has by now attained a more definite denticular expression, and we find this member used in the Corinthian cornice on both the Temple of the Winds and the Monument of Lysicrates. The Greeks evidently first used the regular Ionic entablature with this new capital; but the necessity for a heavier and more elaborate cornice to go with it was at once generally apparent, so the denticular cornice, which had been tried a few times with the regular Ionic column, was evidently adopted as more appropriate for use with this richer Order. And hereafter we find that the denticular cornice is rarely used with the Greek Ionic order within Greece itself.

In the Order (Fig. 79) from Asher Benjamin, is a detail of the Corinthian capital with the principal dimensions for the different parts of the Order of which it composes a part. To epitomize the study of this Order, Plate XLVIII shows in a sort of parallel the assembled three most curious types of Corinthian capitals of which we know. These are from the Monument of Lysicrates, the Porch from the Tower of the Winds, and the Capital of the Tholos at Epidauros.

It is in the Ionian villages of Asia Minor that the Order was most used for the decoration of the porticos and cellas of temples; and the capital from the Temple of Zeus at Athens is the type most frequently used in Asia Minor and in Italy. After the Roman conquest it was frequently employed; and, transplanted to Rome, the version of the Corinthian Order there developed met with the greatest favor.

Caryatids. The Greeks, in place of columns, occasionally used the figures denominated **caryatids** for the support of their entablatures, the most famous example of which is the porch of the Triple Temple of the Erechtheum at Athens. It is possible that the use of human figures for this purpose may have been suggested by some of the earlier Egyptian piers or columns carved with the figures of kings and gods.

The use of a human figure in the place of a column to support an entablature, may be considered as possibly a fourth Greek "Order." There are two varieties of this Order, the **Persic** and the **Caryatid.**

The Persic corresponds to the Doric column, the statue of a man taking the place of the shaft, and the entablature here still partakes of the Doric character; while in the Caryatid Order the column is replaced by a woman, and the entablature partakes more of an Ionic character.

The Persic Order was employed in the cella of the gigantic Temple of Zeus at Agrigentum; and it seems to have been often used as the second Order which we find placed over the column in the center aisle of many Greek temples to support the entablature, on which in turn rested the covering of the naos or nave.

We find on the Acropolis at Athens, on the face of the Erechtheum towards the Parthenon, a superb example of the Caryatid order (Fig. 80). This is the only instance of the use of figures to replace columns in this position, where they take the place of a principal Order and are actually placed in direct comparison, by their close juxtaposition, to large Ionic shafts. The caryatids are kept in scale with the building and surroundings, and still attain the requisite height by the

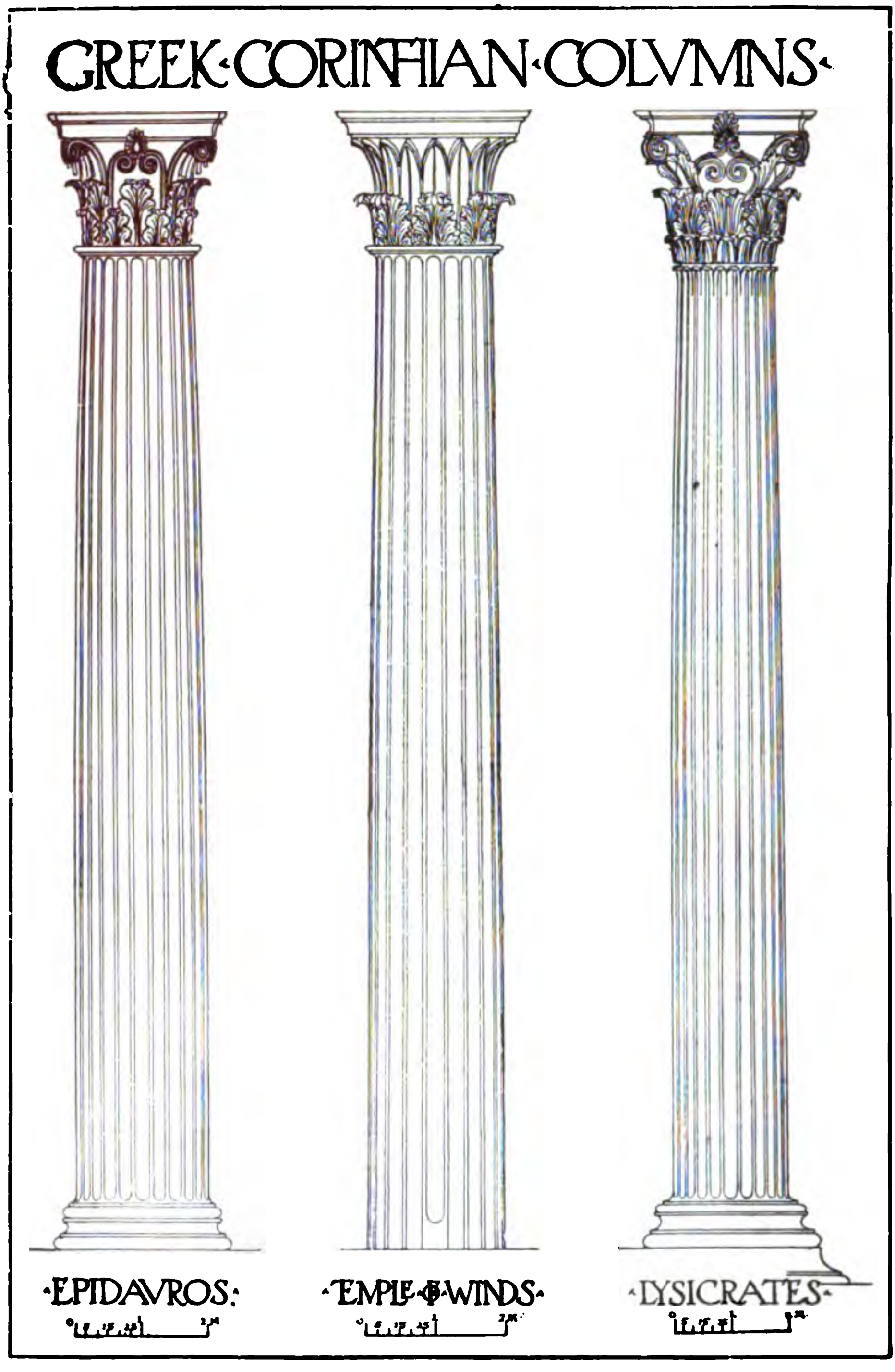
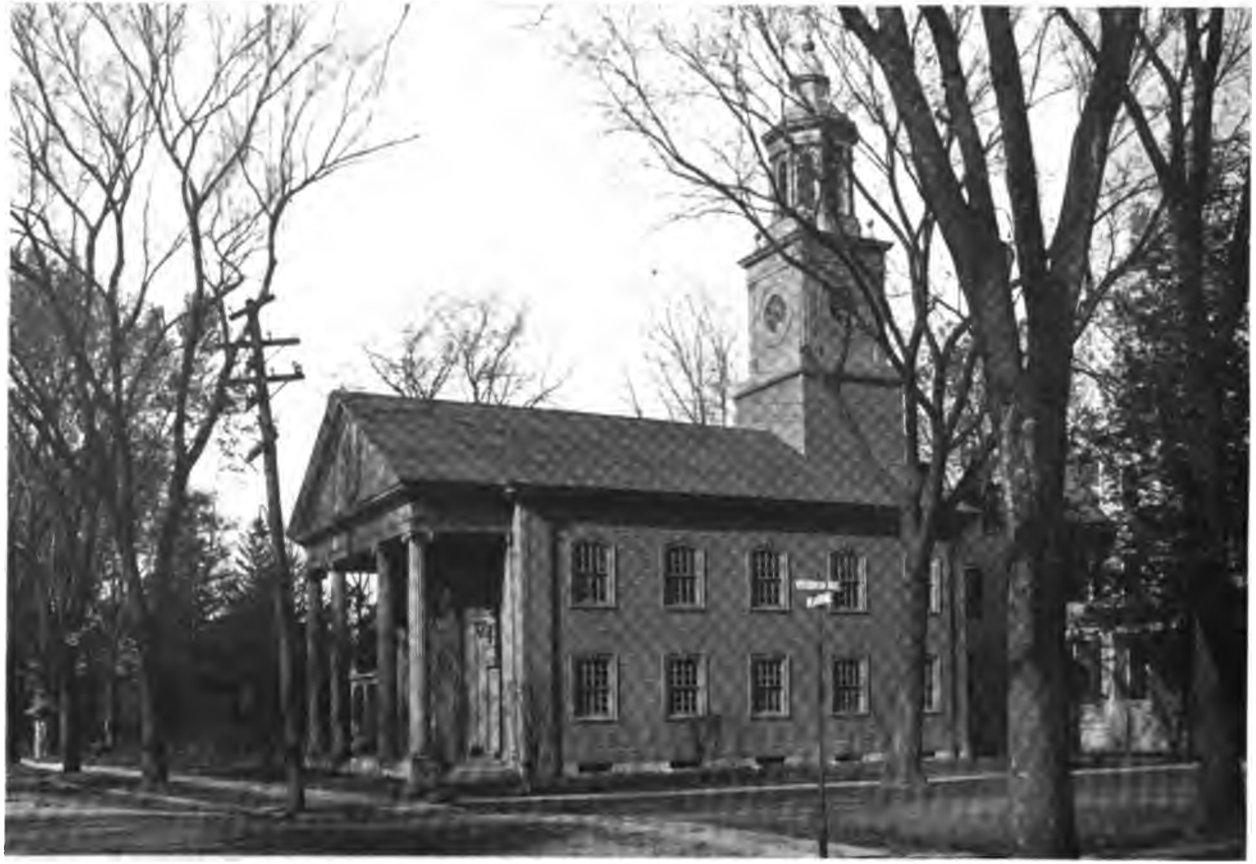
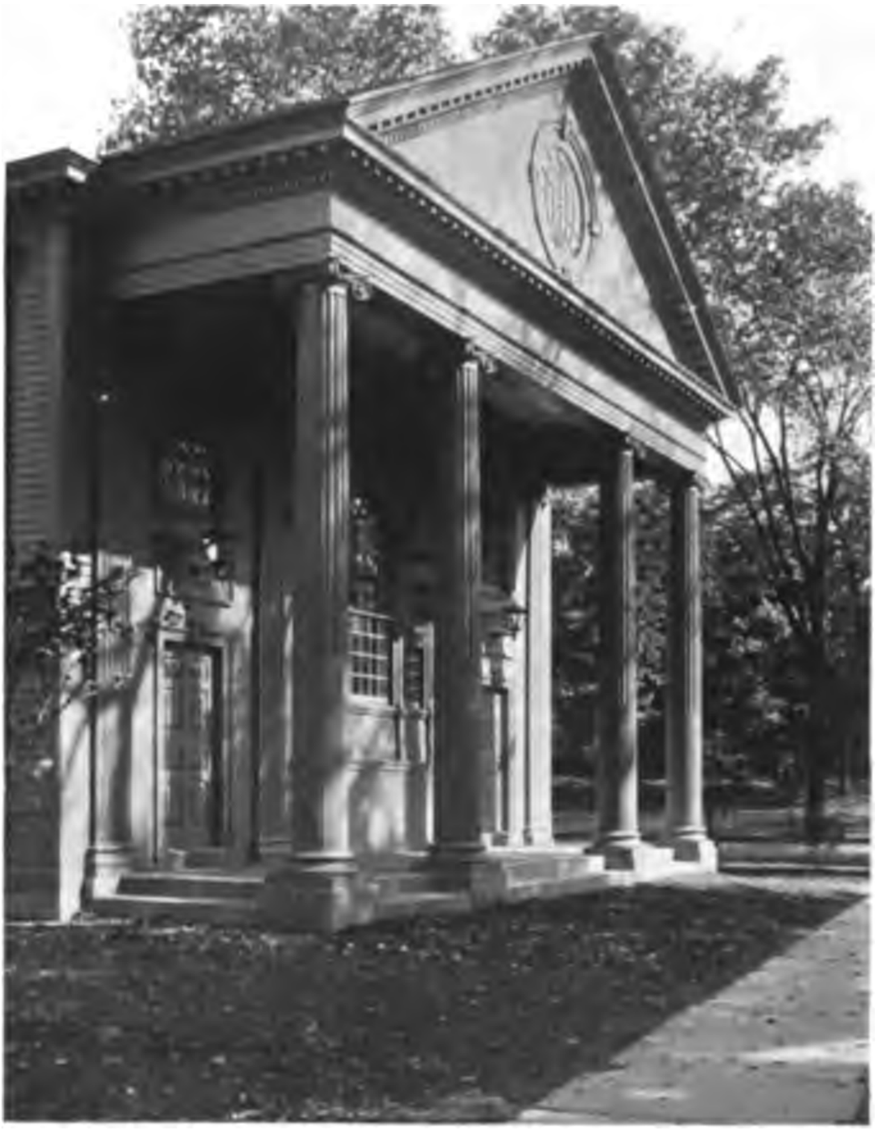


PLATE XLVIII.

(A reproduction at small size of Portfolio Plate XLVIII.)



THE UNITARIAN-UNIVERSALIST MEETING HOUSE AT SUMMIT, NEW JERSEY
Joy Wheeler Dow, Architect, Summit, New Jersey
For details of portico see opposite page



DETAILS OF PORTICO OF UNITARIAN-UNIVERSALIST MEETING HOUSE AT SUMMIT, NEW JERSEY

Jos. Wheeler Dow, Architect, Summit, New Jersey

For full exterior view of church see opposite page

simple expedient of placing them upon a short section of wall, or pedestal, treated with an ornate Ionic antæ cap and base-mould (Fig. 81). This is practically the first instance of the stylobate being given such a distinctive and different treatment; and it was not till almost 100 years later that the columns of the Monument of Lysicrates were placed on their raised basement or pedestal, a custom which the Romans later adopted in many of their buildings.

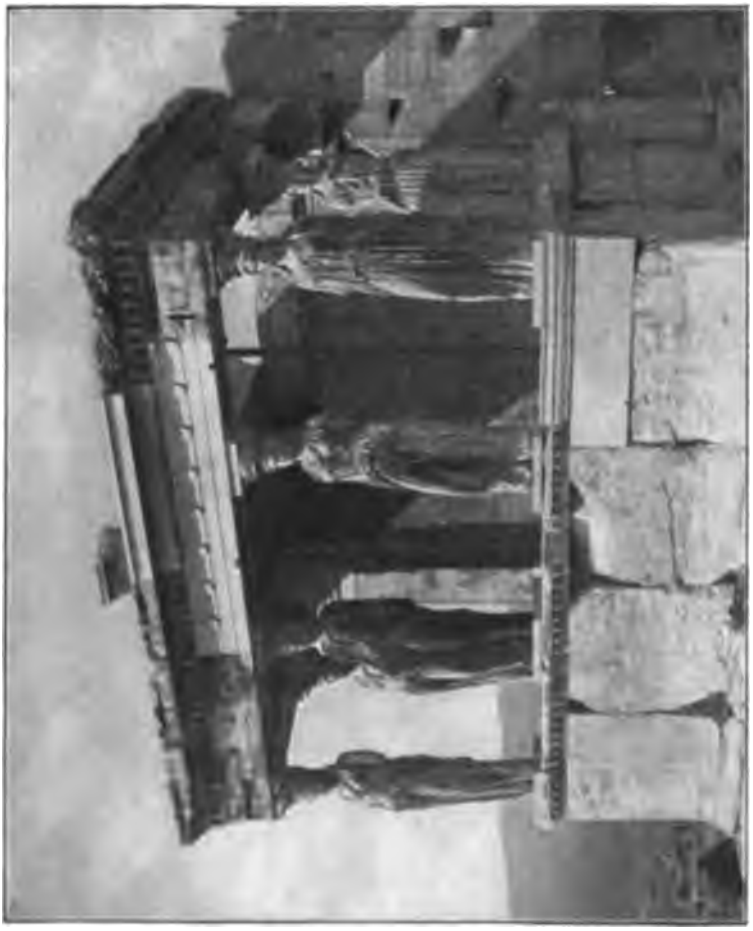


Fig. 80 Porch of the Caryatides, the Erechtheum, Athens.

In place of capitals, these statues carry on their heads a sort of cushion of round mouldings (Fig. 82), which in turn carries the entablature. But though the entablature approaches that of the Ionic

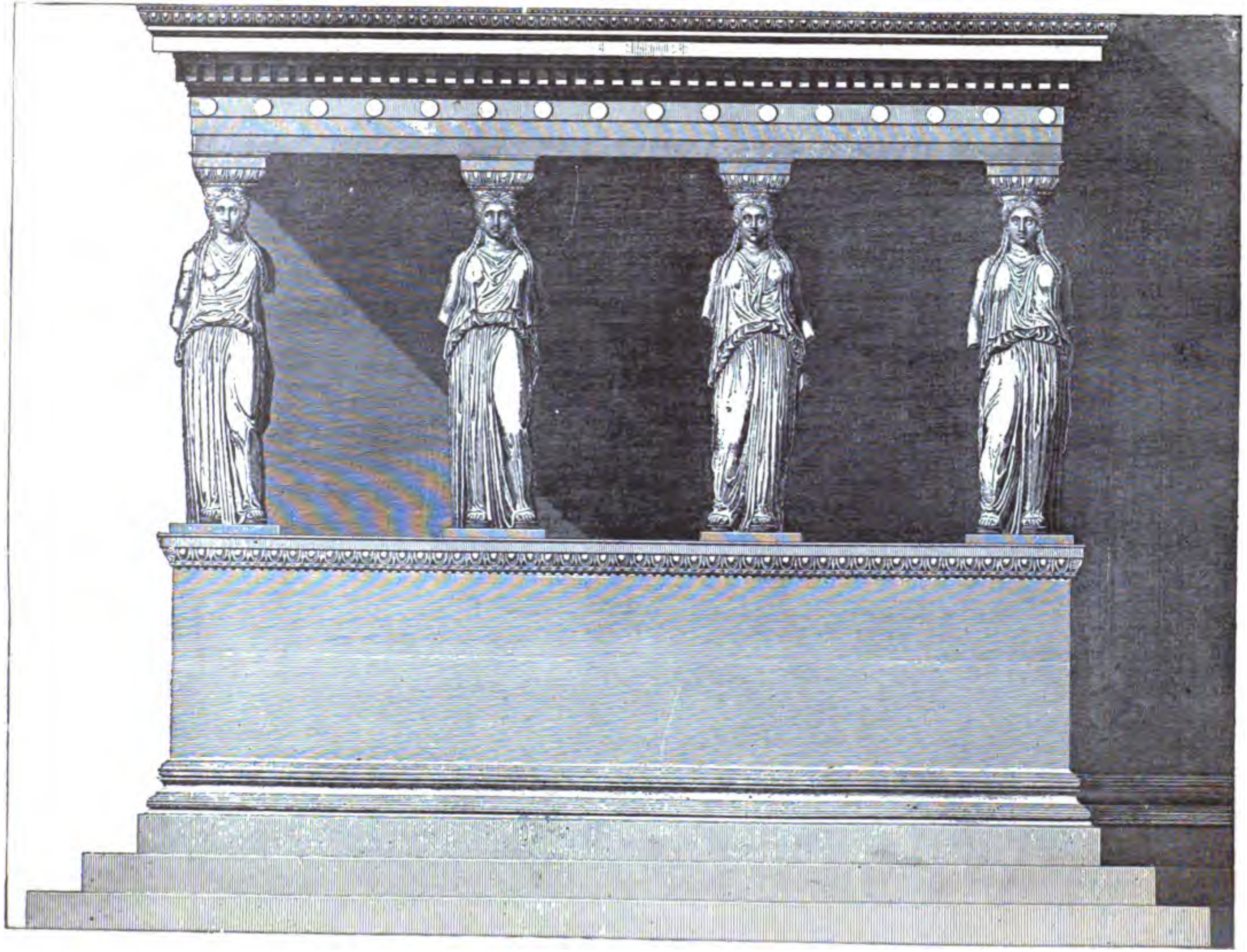


Fig. 81. Porch of the Caryatides, Restored.

Order in the richness and elegance of its decoration, and presents a most beautiful similarity to the Ionic, we notice that the frieze of the entablature is completely suppressed. In effect the cornice rests directly on the mouldings crowning the architrave.

The caryatid sometimes supported a complete Ionic or Corinthian capital upon its head, in the place of the mouldings found on the caryatid in the Erechtheum tribune, though there is no extant example belonging to a good epoch, of such treatment.

GREEK DETAILS

Erechtheum Doorway. A doorway and window from the Erechtheum at Athens are drawn out in Figs. 83 and 84. In Fig. 84 the complete doorway (Fig. 85) is shown, while in Fig. 83 the details are drawn out at a larger scale. The window is placed inside the door opening, with the sections of the architrave and sill placed immediately above it. The proportions of this doorway and window are typical of those employed in the best Greek structures; and it will be observed that the width of the opening at the top is narrower

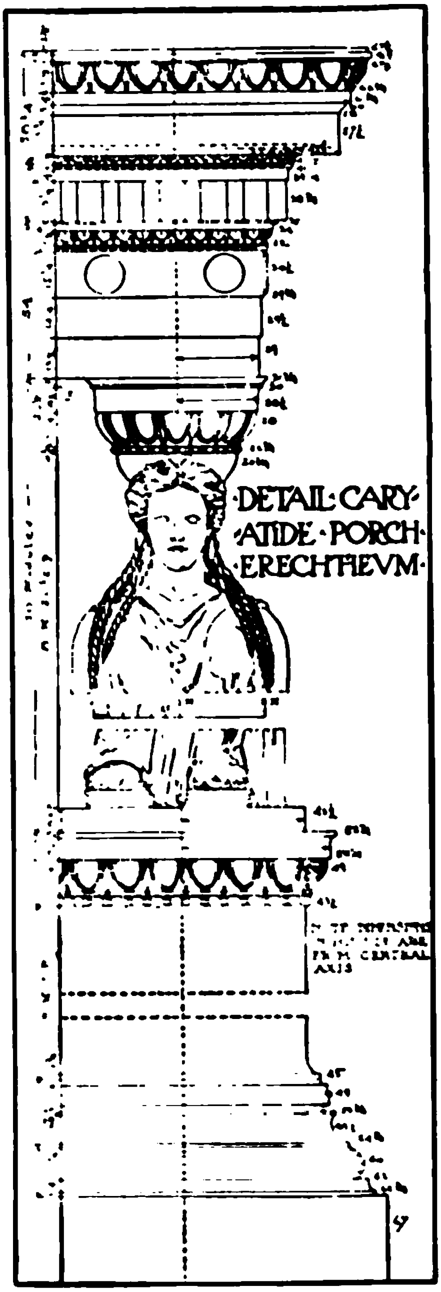


Fig. 82.

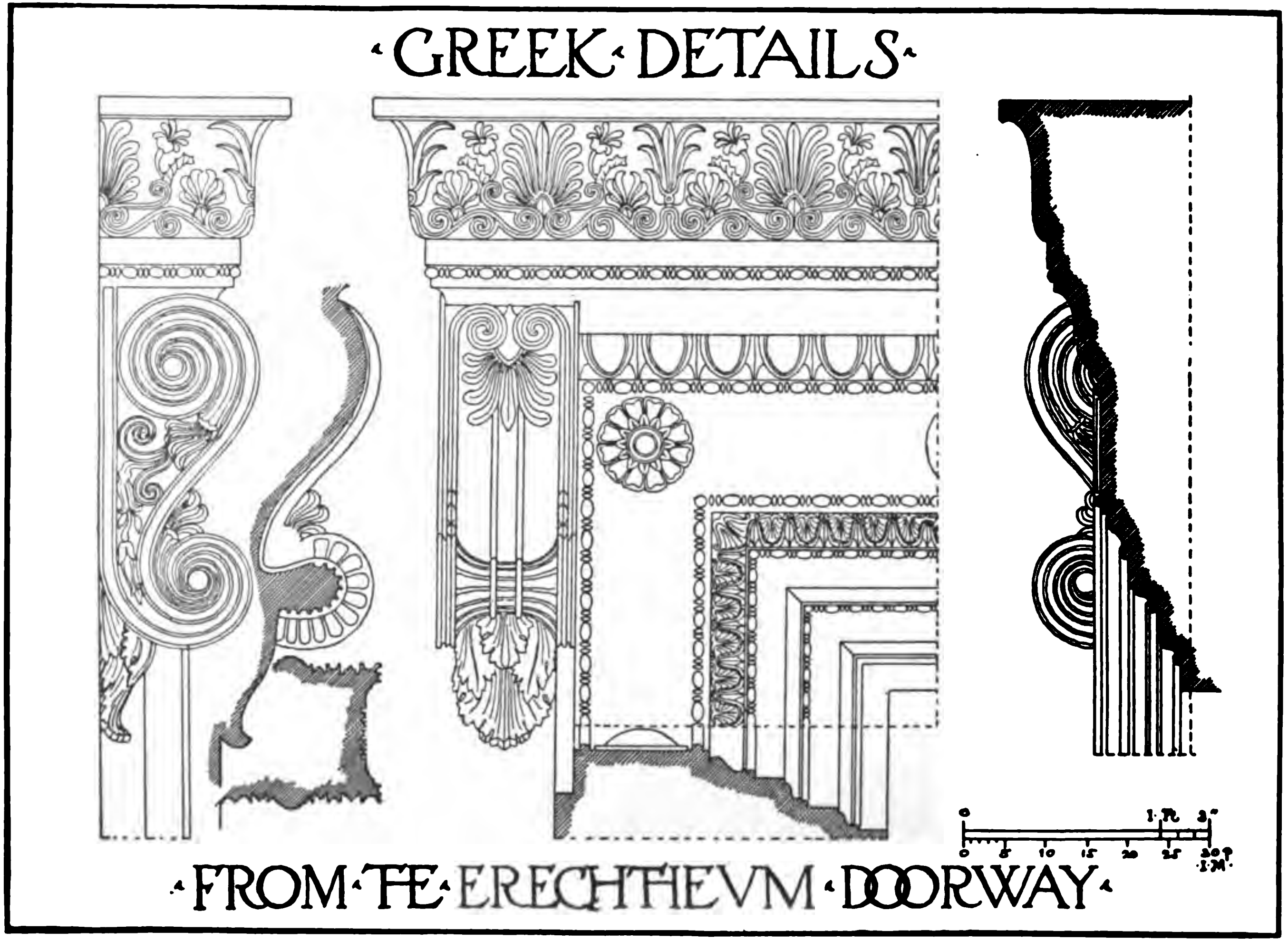


Fig. 83. Details from Doorway of Erechtheum.

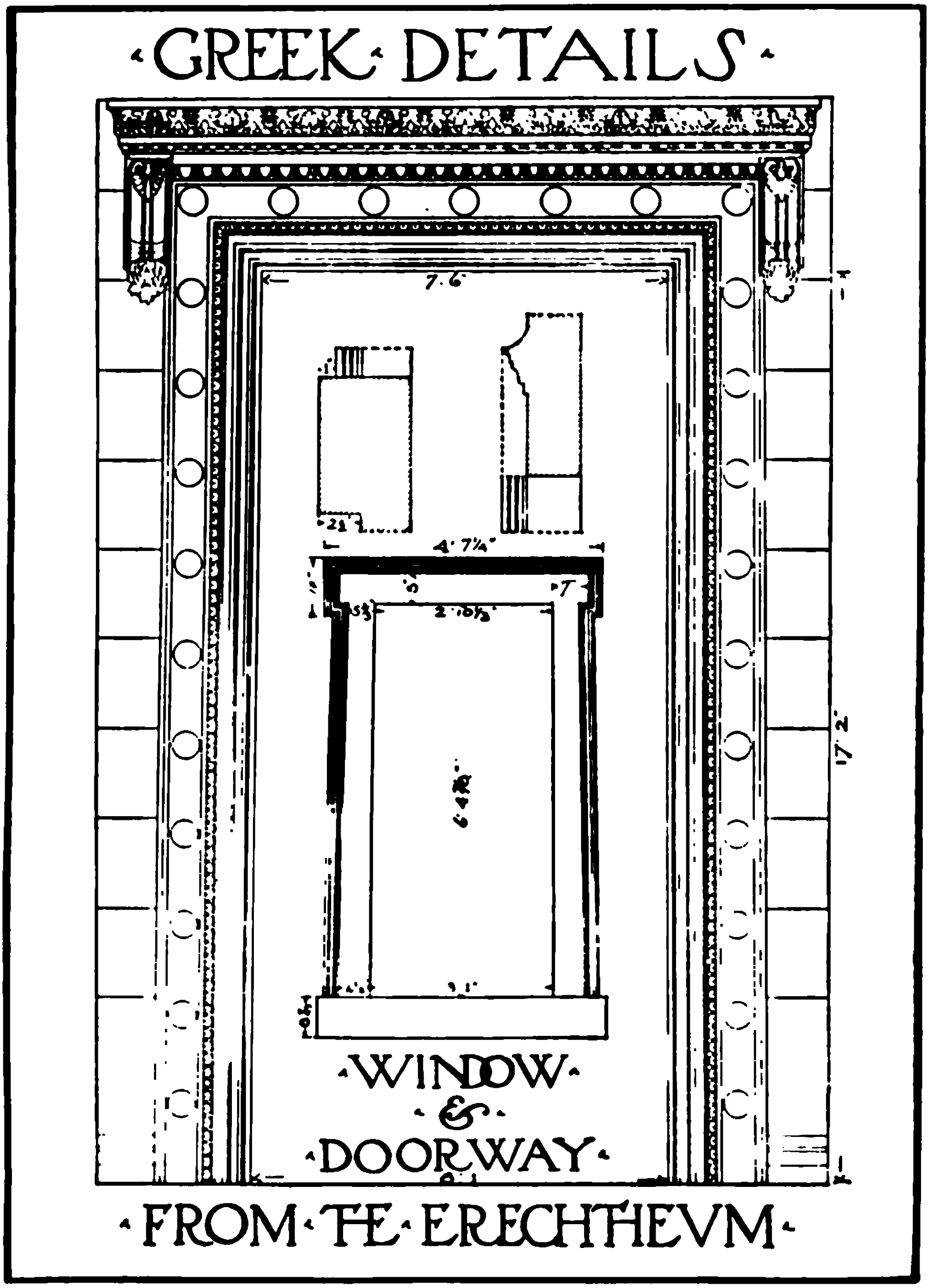


Fig. 84 Complete Doorway and Window of Erechtheum.

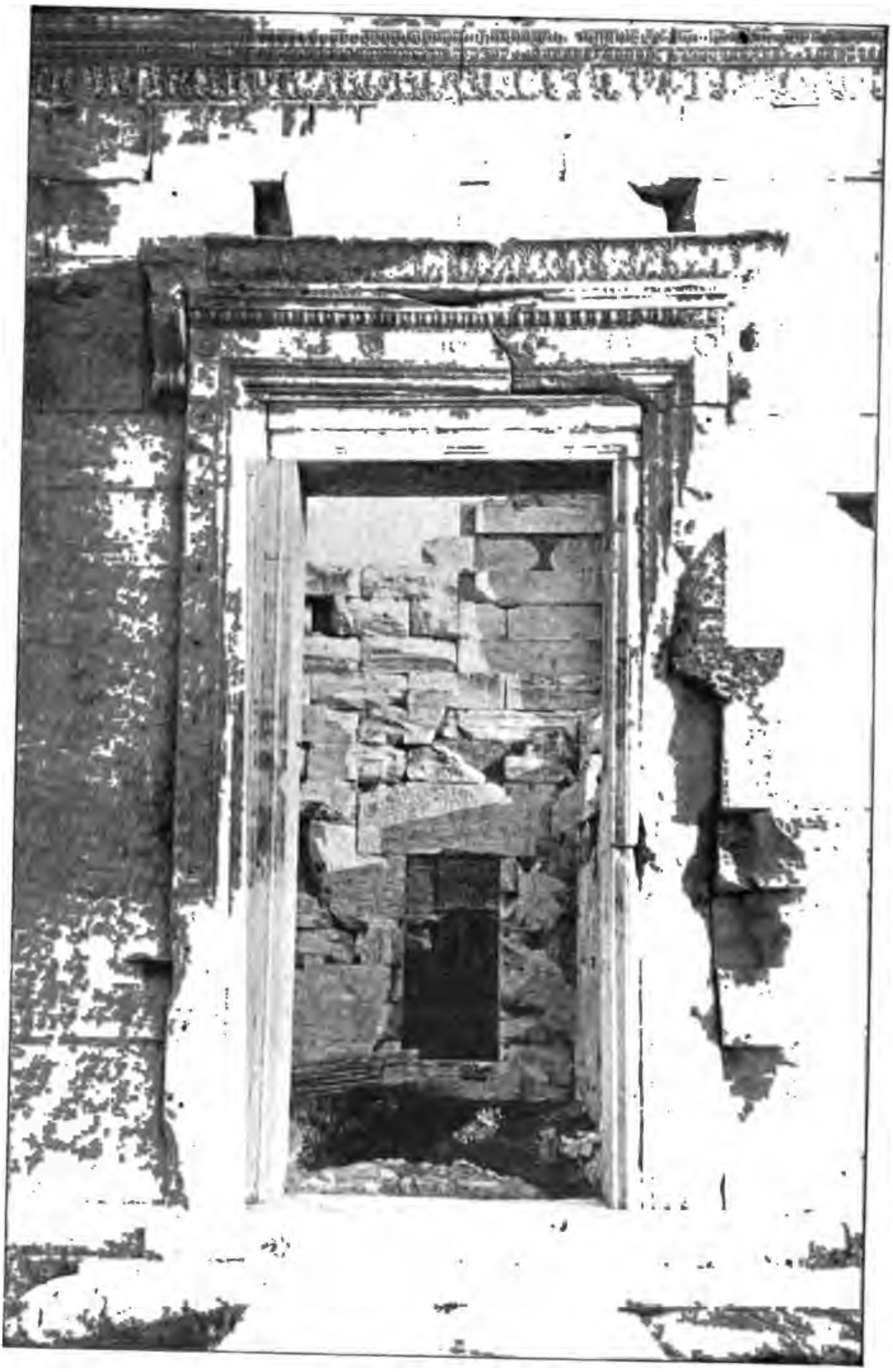


Fig. 85.—Doorway in North Porch of the Erechtheum.

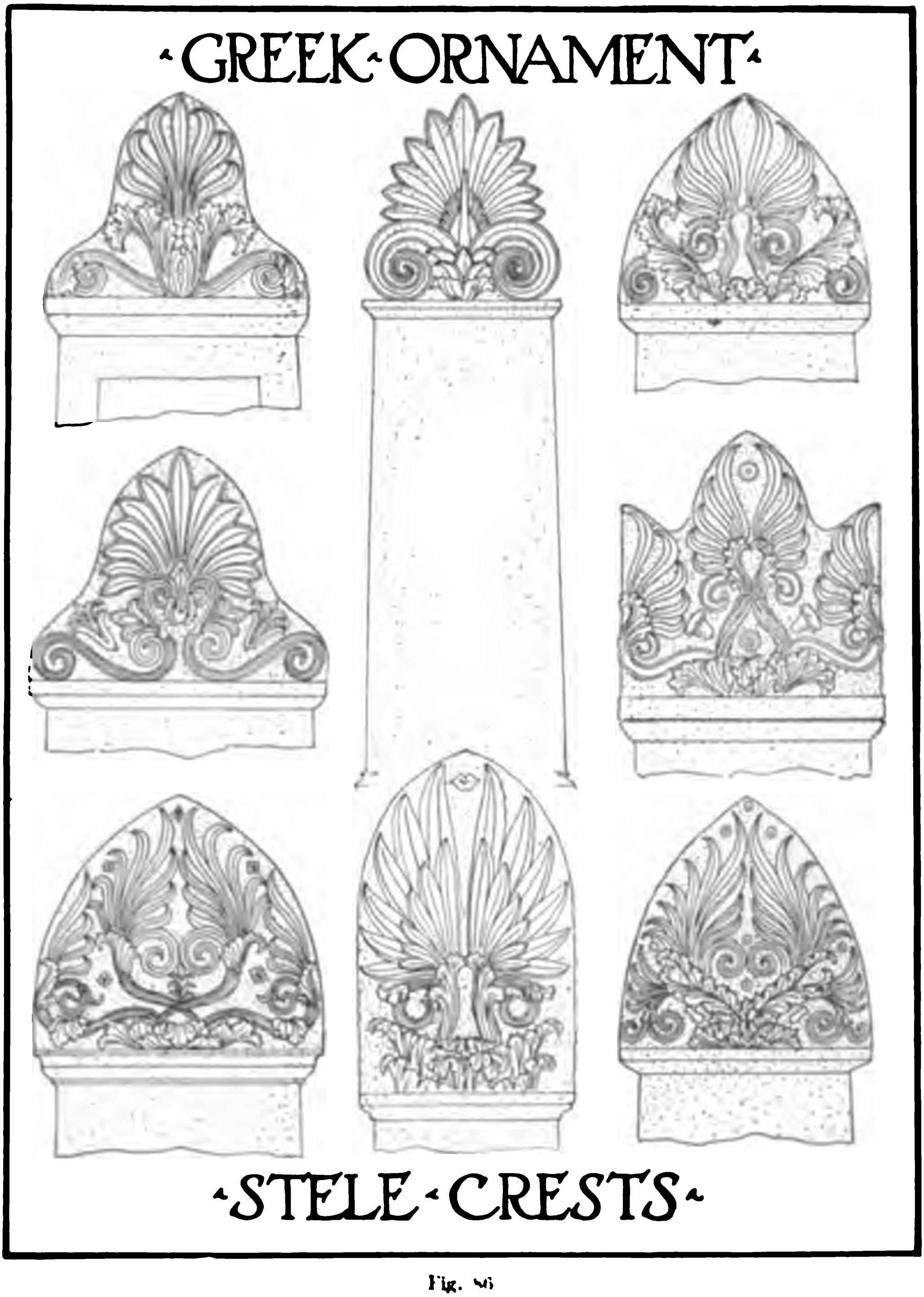


Fig. 96

in each case than it is at the bottom, the lines tapering to some vanishing point on the center line above, where they would intersect. The width of the architrave narrows in the same proportion as it nears the top of the opening. This will sufficiently indicate, from an example of the best period, the general principles followed by the Greeks in their use of doors and windows.

Stele Crestings. The cresting ornaments shown in Fig. 86 were used by the Greeks to finish off the tops of their monumental stelæ or shafts, one of which is shown at full height in the upper central portion of this drawing. The carving occurs on the front and rear of the shaft, which is of comparatively small thickness, being as narrow as the material employed will allow. The Greeks devised a great variety of ornaments for this purpose, all similar in type to the ones here illustrated; but the eight examples reproduced may be considered as fairly representative of some of the best general types.

THE ENTASIS OF THE GREEK COLUMN

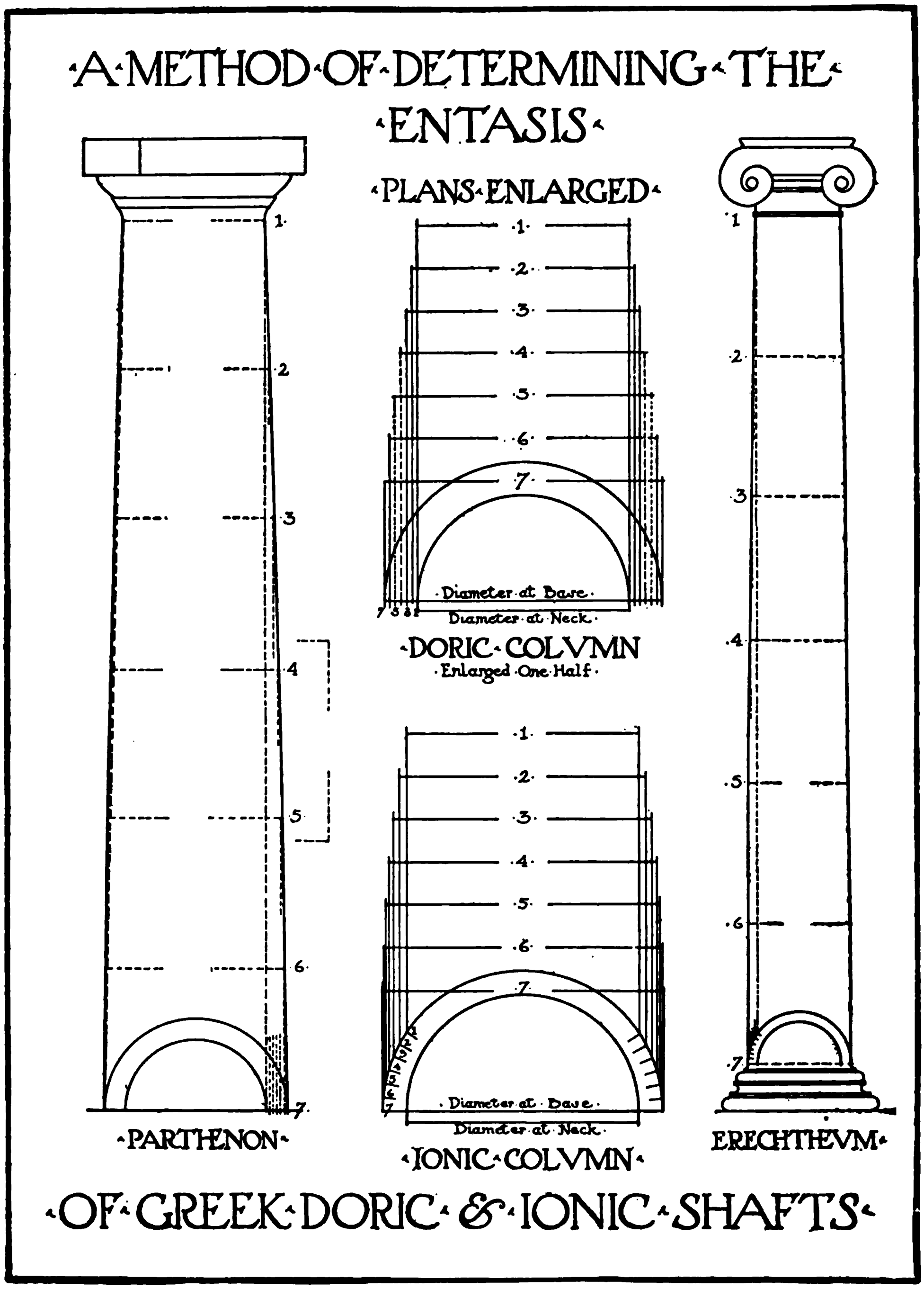
The Greeks, in proportioning their Doric columns, arrived at an apparent system of entasis that is radically different from the more customary method employed on all Roman columns.

No part of the outline of the Doric column is parallel with its axis or center line. From the very bottom, the shaft slopes in towards the center, this slope increasing as it nears the neck of the column, in portions of arcs of circles of a varying though large radius. This could not be described as a true arc, however, inasmuch as at the bottom the line is almost straight for some distance. By referring to Fig. 87, the column from the Parthenon, shown in Plate XXXVII, will be found drawn out with special reference to its outline or entasis. In the middle of the sheet, at the top, the plans of the column at the neck and base are shown enlarged to one and one-half times the size of the column shown in elevation, and here the diameters through the column at the points marked on the shaft are shown more exactly. The total height of the shaft of the column is divided into six equal parts, and numbered from one, beginning at the neck, to seven at the base. The difference between the diameter of the column at the neck and at the base is divided, *on the radial line*, into an equal number of parts, and numbered correspondingly from one at the neck to seven at the base, these lines being extended parallel to the line of axis until they intersect the lines at right angles to them that divide the column into the six parts just referred to. It will then be found that, as is shown at the right of the column shaft, these points will coincide with the outline of the column which passes through them, except at the two points numbered four and five. As is shown more clearly on the other side of the column, where the dotted line indicates a straight line drawn between the points one and seven, the swelling of the column occurs between points six and three; and therefore, at the points numbered four and five, the outline of the column is slightly *beyond* the point of intersection of the two lines that we have just described. This will in the main determine a general scheme for arranging with some correctness the entasis of the column outline of the Greek Doric Order, although it varies somewhat in each of the different old examples.

The Greek Ionic column follows a different system. This shaft also has no portion of its outline that is parallel with the axis of the column, but the outline is at all points more *nearly parallel* than was true of the Doric shaft. This is not only because of the slight difference between the diameter at the neck and base, and the greater height of the column, but also because the lower portion of the shaft more nearly approximates a perpendicular line than in the earlier Order. As we have already mentioned, in one instance there is a very light belly on the Ionic shaft, whereby its diameter at a point one-third the height of the shaft above the base is $\frac{1}{134}$ greater than it is at its lower diameter. This is the exception, however, and the shaft shown in Fig. 87 is dimensioned after the more general Greek custom.

This shaft is also divided into six equal parts, and the line of the diameter at the neck is set off on the *circle* expressing the plan at the base. The distance *on this circle* is then divided into six equal parts, and is numbered correspondingly with the divisions on the shaft of the column, as we have already done in working out the Doric entasis. The points determined on this plan of the column at the base are then extended, as before, until they intersect the lines dividing, at right angles to them, the shaft of the column, which will determine the points through which the column outline should pass. This method determines of itself the exact increase of the "tumble-home" of the column in its upper portions. The arc described by this outline approximates, although it does not exactly coincide with, a hyperbolic curve.

The Greek Corinthian shaft has no set and determined entasis.


A·METHOD·OF·DETERMINING·THE·
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·Diameter·at·Base·
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·IONIC·COLVMN·
·PARTHENON·
ERECHTHEVM·
·OF·GREEK·DORIC·&·IONIC·SHAFTS·

Fig. 87.

Each of the three examples shown in Plate XLVIII follows a different method. The shaft of the column from the Temple of the Winds should be laid out by the Doric method, the different effect being given by the comparatively small difference between the diameter at the neck and at the base, as well as by the extra height of the shaft and the form of the capital. The shaft from the Monument of Lysicrates follows very nearly the Ionic method, differing from it, however, in that the lower one-third of the column is in outline more nearly parallel to the line of the axis than the method we have described for determining the Ionic shaft. The column from the Tholos at Epidauros follows the method afterwards used by the Romans, the lower one-third of the column being straight and perpendicular, with the outline parallel with the line of axis, while above this point the diminution is determined by the same process as we employed on the shaft of the Ionic column, being restricted in its application, however, to the upper two-thirds of the column shaft.

GREEK INTERCOLUMNIATION

The **intercolumniation** of a colonnade is the spacing apart of the columns, the distance given being that *in the clear* between them. The distances between the centers of the columns are invariably one diameter more than the intercolumniation or space between.

Doric Intercolumniation. The spacing of all Doric columns is determined by the location in the frieze of the triglyph and mutule, the column invariably coming beneath these ornaments. In the best Greek work the columns are so spaced that there is but one triglyph over the opening between them; and this arrangement is termed **monotriglyphic intercolumniation.** There are a few instances where the intercolumniation has been increased so that two triglyphs come in the space between the columns, when it is known as **ditriglyphic intercolumniation.** This usage in true Greek work is very rare, except in some such special instance as that shown in the Propylæa at Athens (Fig. 88), where, in order to get the width necessary for such an important entrance way, the two center columns are given this wide spacing. The Greeks, as has already been said, placed the triglyph at the very corner of the frieze; and, as the metope is invariably square, it then becomes impossible for the center of the triglyph to come over the center of the column in either elevation, as the placing of the latter in relation to and in plane with the face of the frieze above is a more important consideration. This causes the columns at the corner of the building to come closer to each other than anywhere else along the colonnade, and the effect itself is neither unpleasant nor very apparent, this extra strengthening of the corner of the building or the end of the colonnade seeming natural and to be demanded by the eye of the observer. By again referring to Fig. 88, the façade of the Propylæa at Athens forming a six-columned entrance portico, the usual methods of spacing the Greek Doric order is amply illustrated. The central space, the principal entrance to the Acropolis above, demanded a wider opening than that given by the monotriglyphic intercolumniation, therefore the builders very naturally increased this center opening by making the spacing of the columns ditriglyphic. The two spaces on either side of this are laid out on the regular monotriglyphic system of intercolumniation, as will be readily seen; while the two outside spaces, coming at the corner of the build-

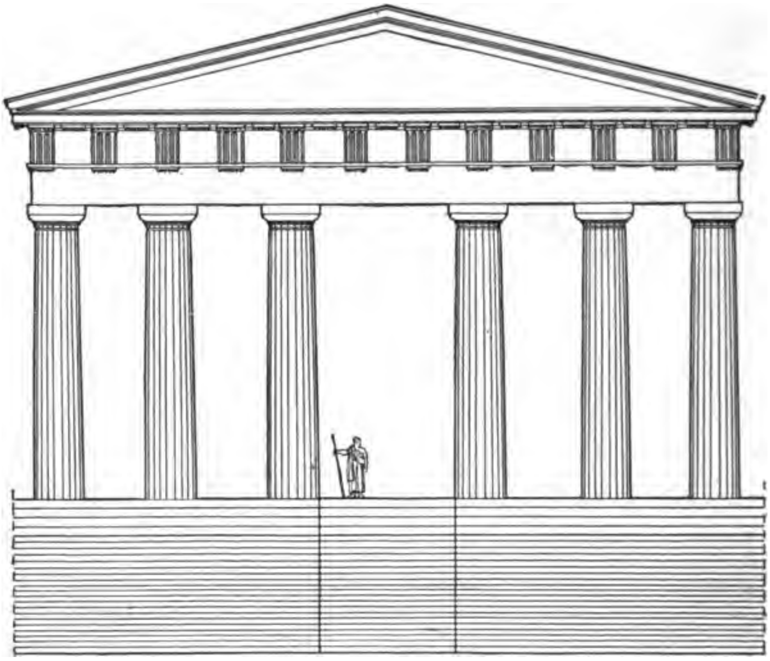


Fig. 88. The Propylæa, Athens.

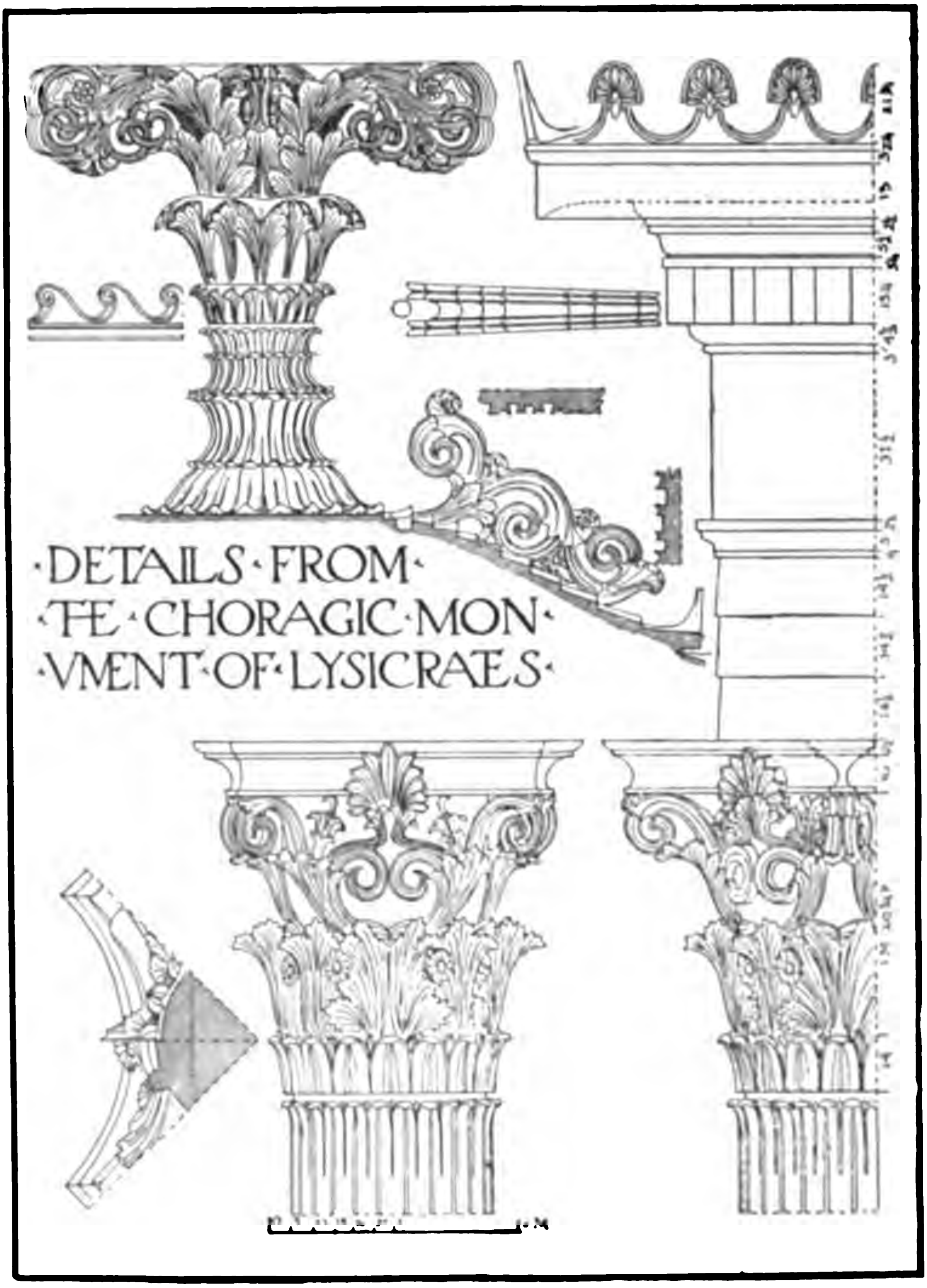


PLATE XLIX.

(A reproduction at small size of Portfolio Plate XLIX.)

ing, require the closer placing of the columns, on account of the triglyph in the frieze occurring at the angle.

This system of spacing is rather interestingly shown in Fig. 89, where it will be noticed that, with the exception of the Temple of Philip, an example of small size and comparative unimportance, all of the other well-known buildings whose column spacing is there illustrated in plan are shown to have monotriglyphic intercolumniation. Of course, using as close a spacing of heavy columns at a small scale as this requires, gives very little width between them; and in this exception (the Temple of Philip), even with ditriglyphic intercolumniation, there is still something less than seven feet clear opening; while, if the usual spacing had been employed, there would have been only about four feet, as shown in the small Temple of Apollo in the same illustration.

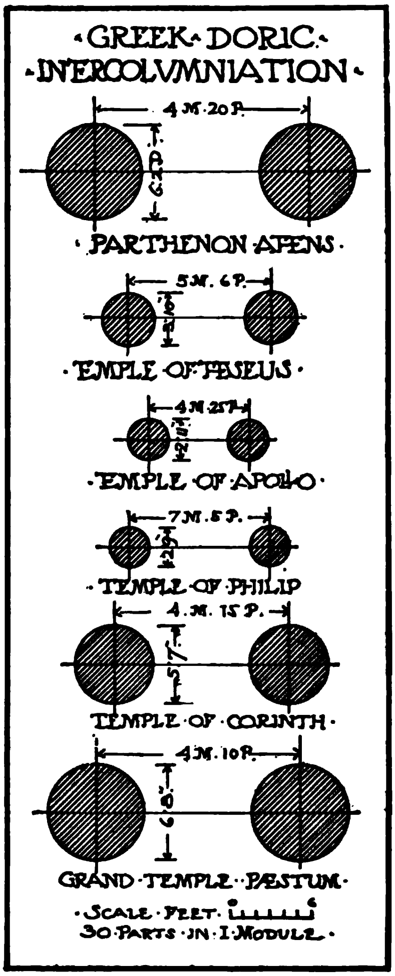


Fig. 89.

Ionic Intercolumniation. The intercolumniation of the Greek Ionic Order is shown in four well-known examples in Fig. 90, after the same fashion as in the illustration of Greek Ionic spacing. When relieved from the hampering restrictions of the mutule-triglyph spacing of the Doric order, we immediately find more divergence in the relative placing of the columns, although, in the two examples shown from the Erechtheum—one of the North Porch, or Portico to the Temple of Minerva Polias, in which four columns were employed; and the other from the six-columned entrance to the east—we find at once the smallest and the greatest distance between the columns, the former being spaced apart on centers eight modules or four diameters, leaving an intercolumniation of three diameters in the clear, while the latter are spaced six modules or three diameters on centers, with an intercolumniation of two diameters. In part this difference may be accounted for by the fact that the wider and fatter pediment of the latter example requires more apparent support, as undoubtedly would be true. As the Greeks had the good taste to avoid placing a column beneath the center of a pediment—which would be unnatural where, as in this instance, an entrance doorway comes on the center line of the pediment—they were compelled to increase the number of columns from four to six. Nevertheless, the North Porch (Plate XLIV), with its wider intercolumniation, remains a more pleasing example of proportionate spacing than the principal entrance portico on the same building.

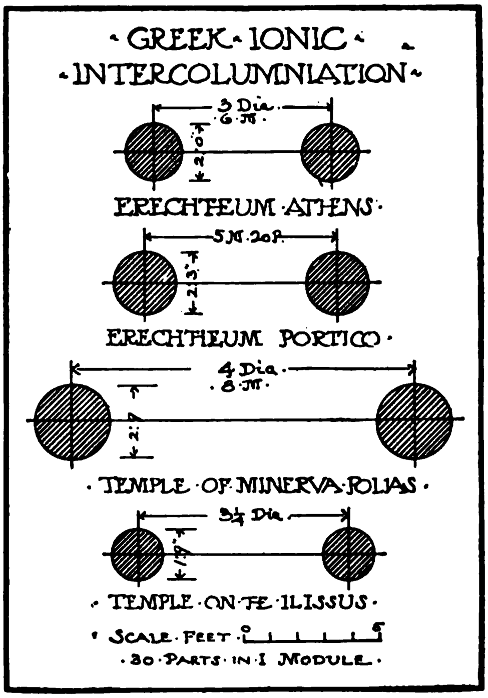


Fig. 90.

Corinthian Intercolumniation. From the few examples of the use of the Corinthian Order left us by the Greeks, it would be injudicious to deduce any general rule for their intercolumniation, inasmuch as each example is an individual solution of a special problem. In the Monument of Lysicrates, the spacing of six modules and six parts on centers was employed; but it must be remembered that this monument was circular in plan and the whole Order very small in scale, the

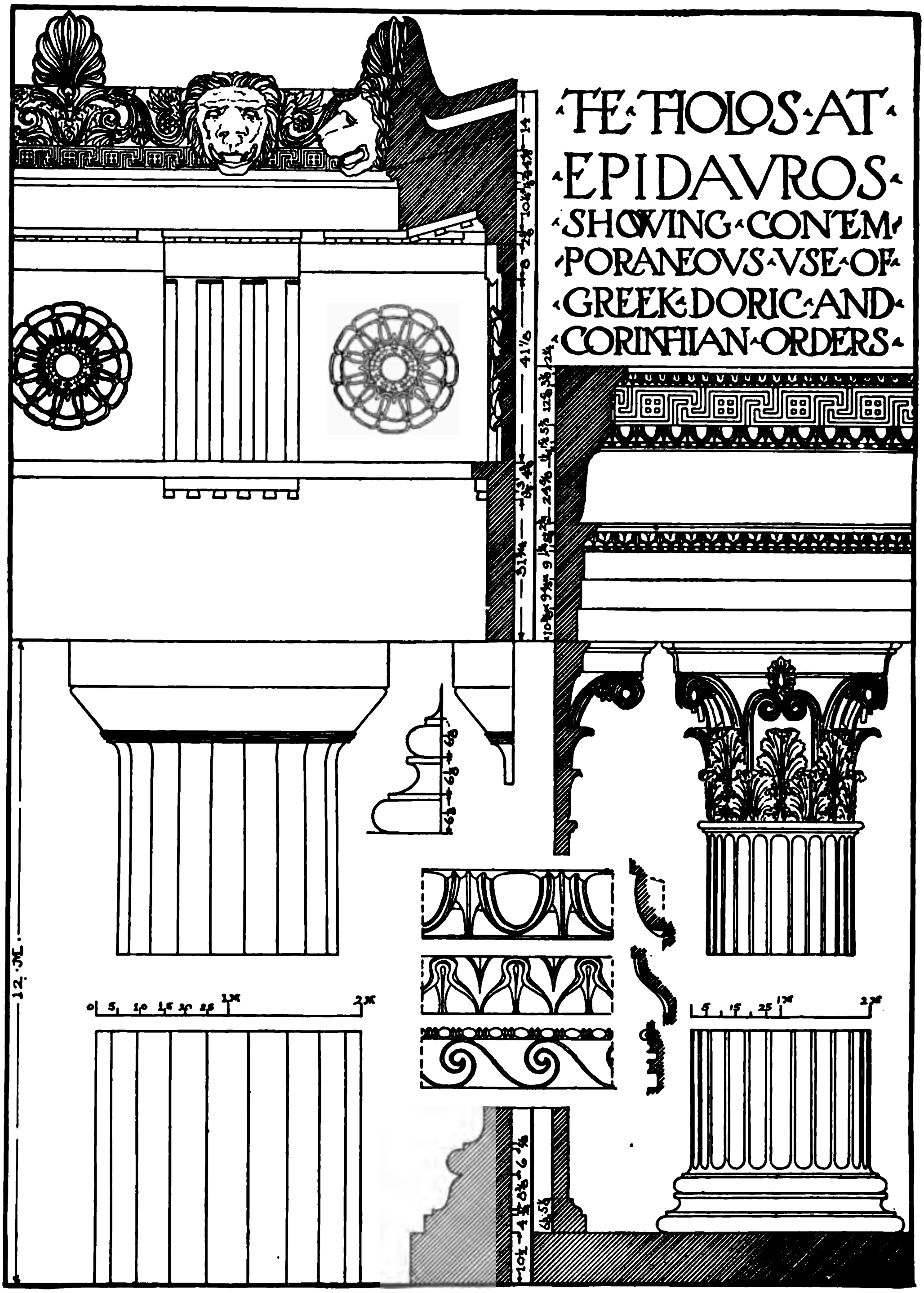
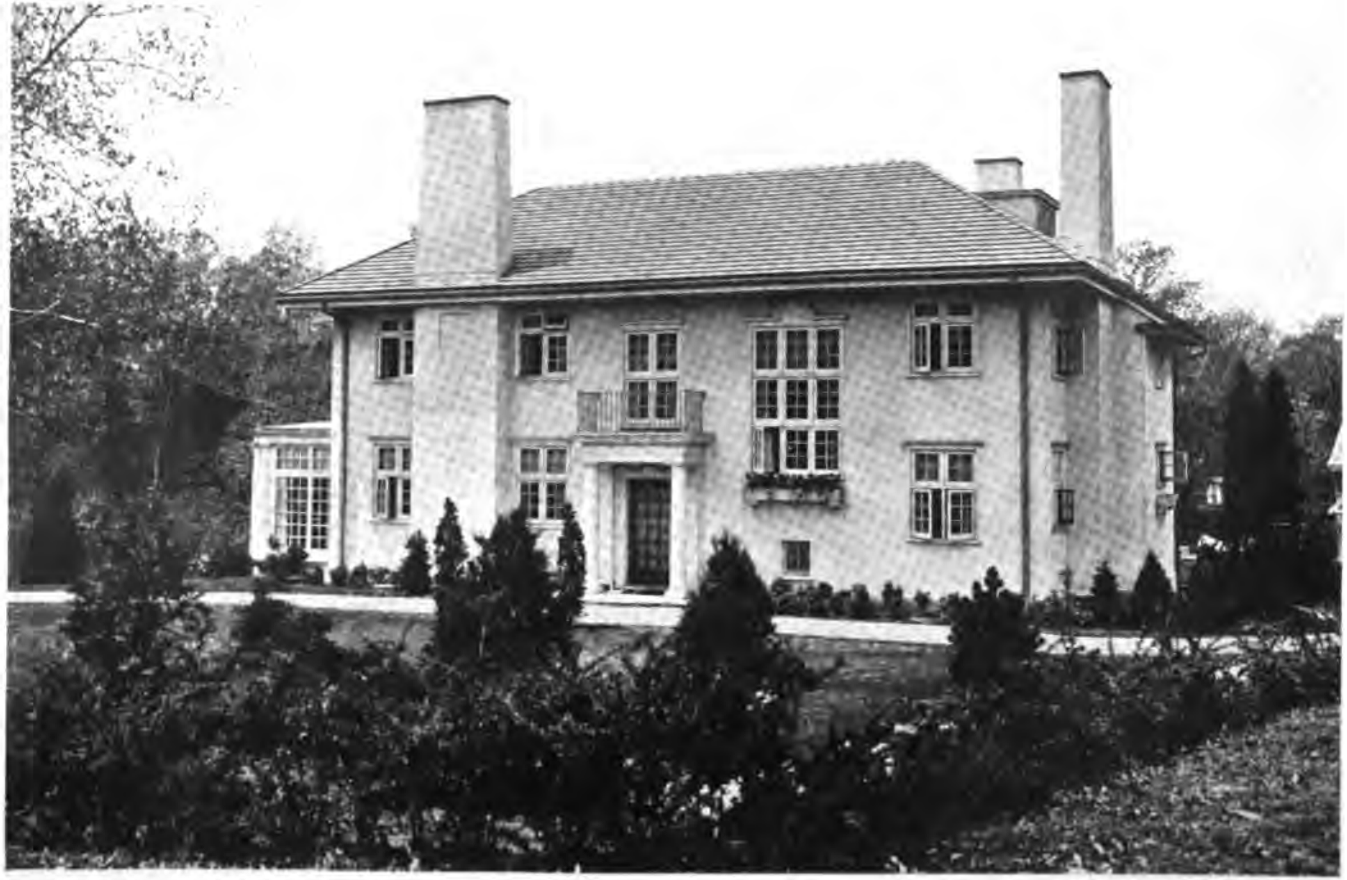
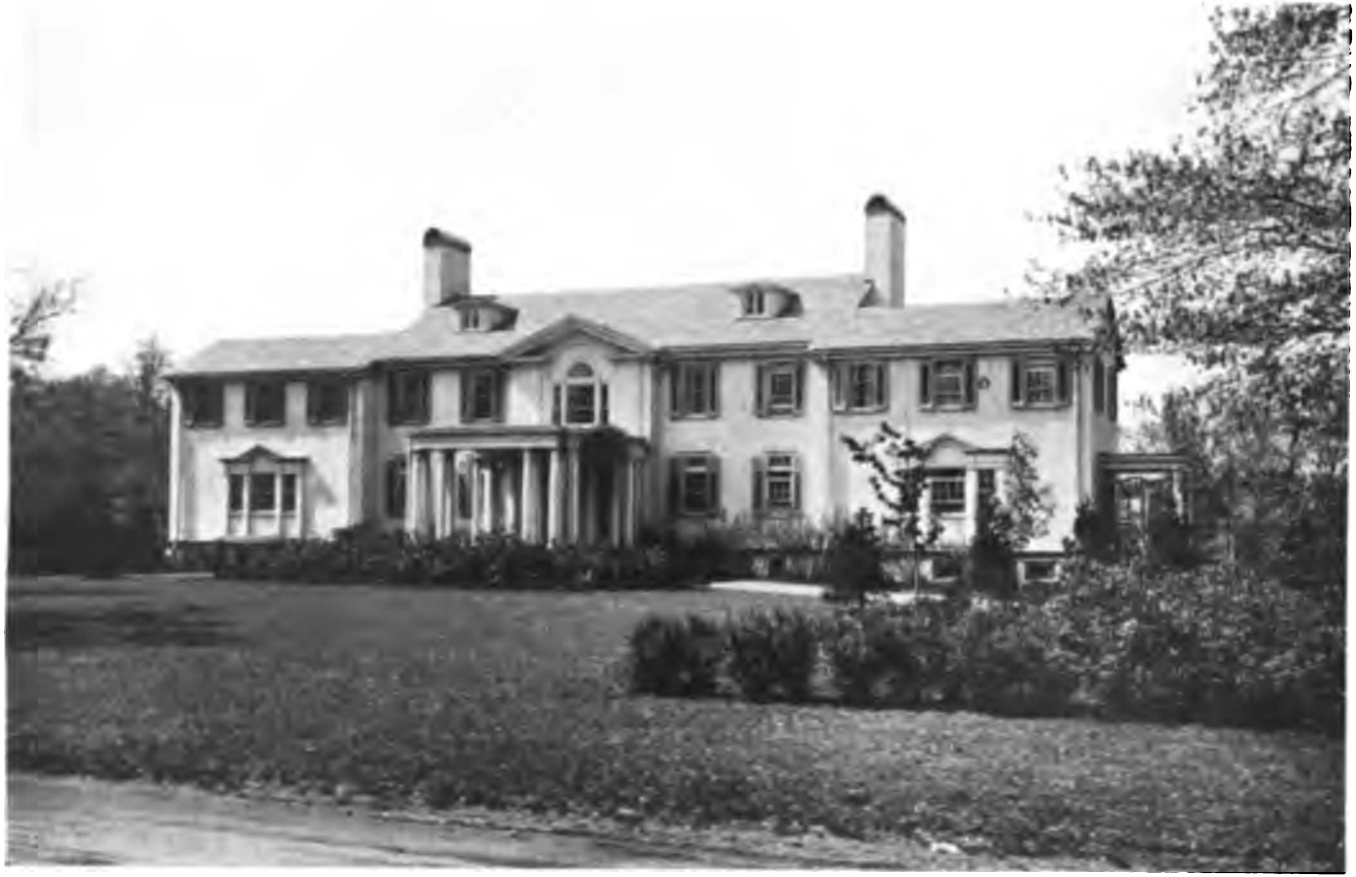

THE THOLOS AT EPIDAVROS SHOWING CONTEMPORANEOUS USE OF GREEK DORIC AND CORINTHIAN ORDERS
41 1/8
51 1/4
12 M.
0 5 10 15 20 25 1 M 2 M
5 15 25 1 M 2 M

PLATE L.
(A reproduction at small size of Portfolio Plate L.)



RESIDENCE OF D. A. JOHNSON, ENGLEWOOD, NEW JERSEY
Davis, McGrath and Kiessling, Architects, New York City



RESIDENCE OF H. N. FLANNIGAN AT ENGLEWOOD, NEW JERSEY

Davis, McGrath and Kiessling, Architects, New York City

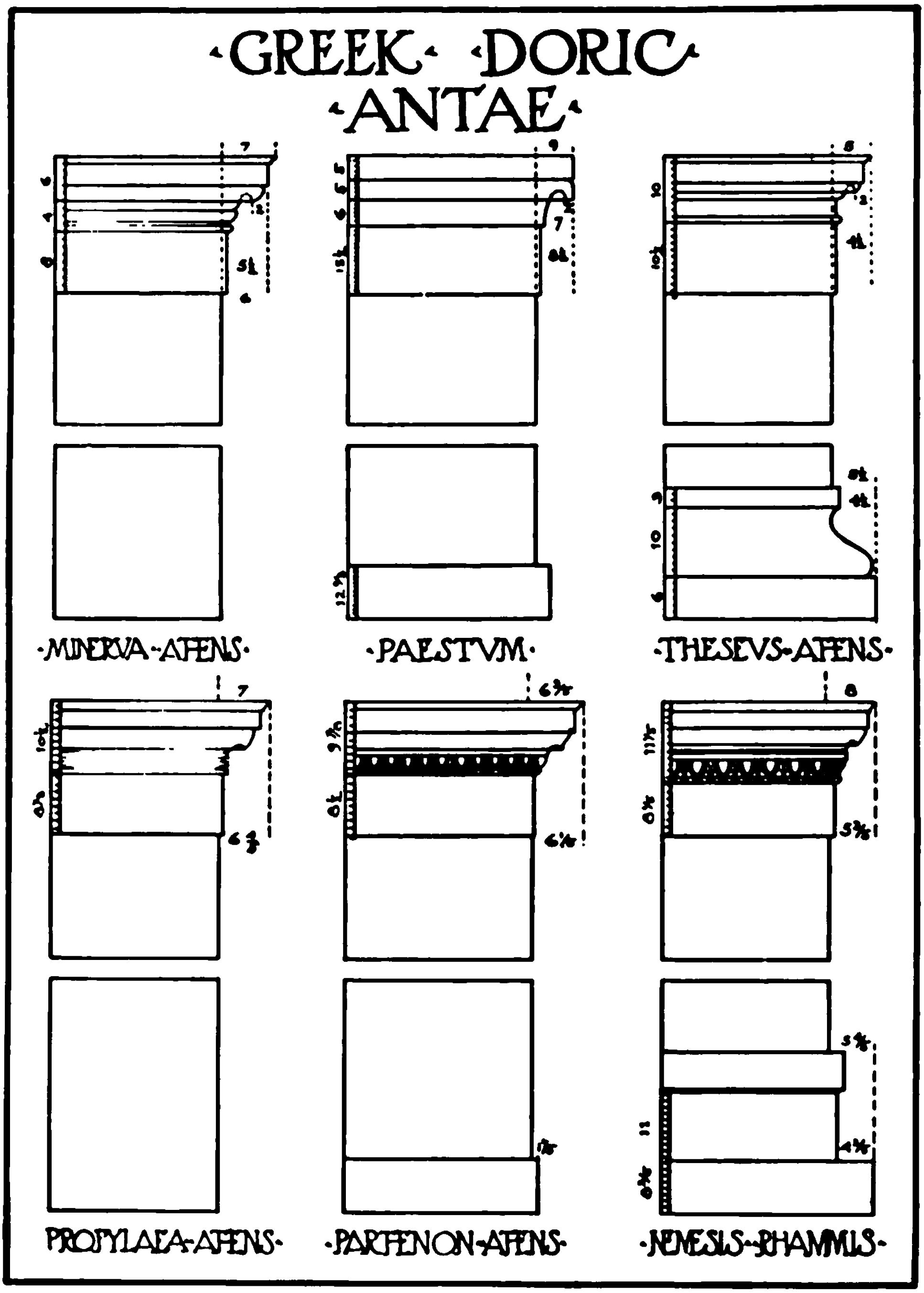

·GREEK· ·DORIC·
·ANTAE·
·MINERVA·ATHENS·
·PAESTVM·
·THESEVS·ATHENS·
PROPYLAEA·ATHENS·
·PARTHENON·ATHENS·
·NEMESIS·RHAMNUS·

Fig. 91.

first fact especially having a very important bearing on the intercolumniation of the column shafts; while their being engaged to the wall surface behind is also an important factor. In the Tower of the Winds, the columns are used to support a small doorway pediment after a more modern taste, and this example is therefore quite worthless in this connection. In the circular Temple of Epidauros, we have another instance of the Greek use of this Order; but this also has a special set of attendant circumstances, the temple being round in plan, and the Corinthian order being used on the interior; while, although the columns are detached from the blank wall behind them, there is in reality only a very narrow separating ambulatory or passageway. In this instance the columns were spaced apart on centers nearly seven modules, with an intercolumniation of five modules or two and one-half diameters.

GREEK ANTAE OR PILASTERS

Doric Pilasters. The plan adopted by the Greeks in their Doric temple structures, was one that would necessarily increase the importance of the column shafts, and required a sharp demarcation between the fluted columns and the contrasting plain wall surface. In the early temples with an entrance porch, the side walls were carried forward, and their ends were finished by a pilaster treatment on their front, returning on the two sides; while two columns were placed between them. These slightly projecting pilasters, termed **antae,** used by the Greeks, are employed for the most part upon the ends of walls. An elevation of the front of such a building (Plate XXXV), gives us the effect of an entrance porch composed of two columns and two pilasters, the latter supporting, on each side, the ends of the entablature overhead. In Greek architecture these pilasters are seldom used in important positions, on account of the extreme importance given to the column, and the resulting fact that the Greeks so arranged the plans of their buildings as very seldom to require the use of a pilaster in any important location. Of course, being placed behind a series of columns in this fashion would naturally render the pilaster very unobtrusive, and this effect was emphasized by its manner of treatment as a part of the wall itself. The shafts of these pilasters are always plain, and never given any entasis, being the same width at the top as at the bottom. The capitals differ very radically from the

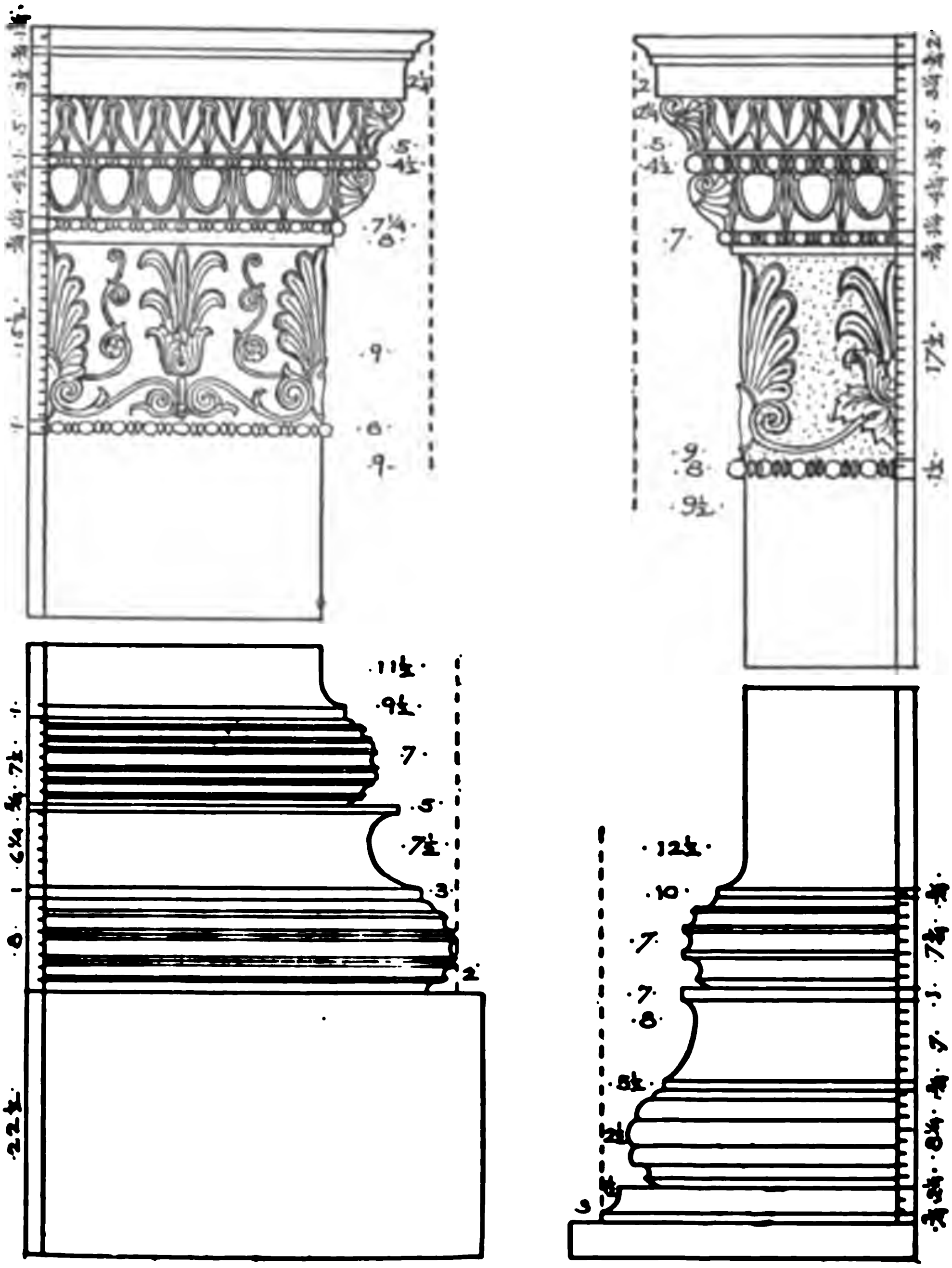


Fig 92. Greek Ionic Pilasters.

capitals of the column, inasmuch as they consist of merely a series of fine mouldings below the abacus and set on top of one or more fascias, as in Fig. 91. The contrast offered by the plain surface of these pilasters to the fluted columns with which they are ordinarily used, is very effective, while by their very character, when seen from any distance, they tend to become a part of the wall to which they were attached.

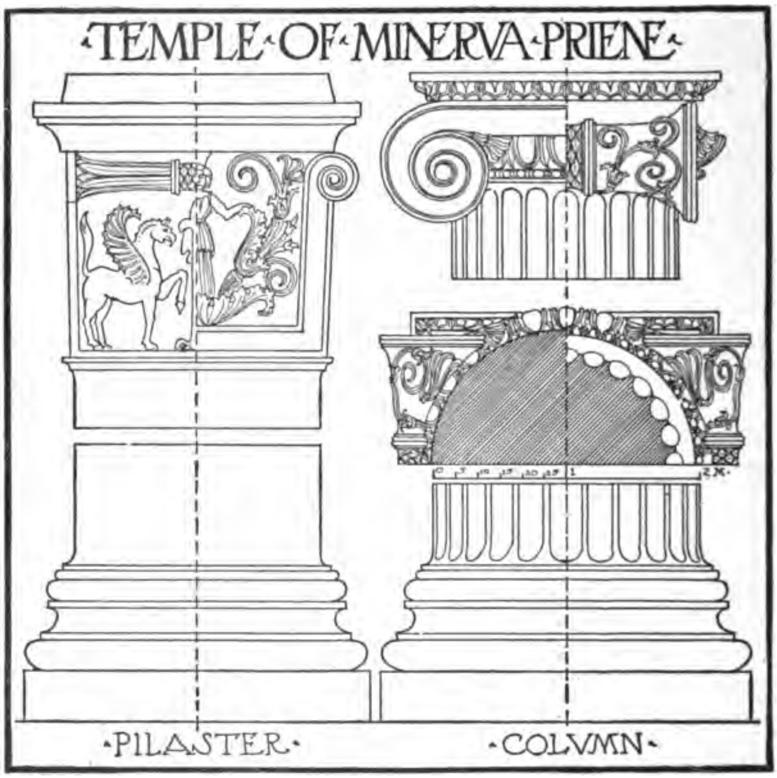


Fig. 93. Comparative Column and Pilaster Treatment.

These pilasters are sometimes given a base the same as the columns, but their cap and base are more customarily formed by the mouldings which are placed at the base and top of the wall against which these antæ are placed. In the Doric Order they generally have a plain projecting plinth base, with no mouldings, although sometimes the shaft descends directly to the stylobate or platform, as in the column of the same Order.

Ionic Pilasters. With the Ionic column the Greeks employed many different types of pilaster capitals, some being very elaborate in their form and ornamentation. The Ionic antæ, the same as the Doric antæ, have for their bases the lines of the base of the walls; and for the crowning mouldings of their capitals, the mouldings are covered with ornaments, eggs-and-darts, beads and reels, honeysuckles, etc. The capital of the Ionic antæ receives from the school of Pythius sculptured decorations of great variety. The best type is undoubtedly that which we find used in the Erechtheum, with the various examples of the Ionic ornamented capital and column which we have already illustrated. Two of these pilasters are shown in Fig. 92. These antæ capitals are moulded and carved quite elaborately, while along the surface of the frieze in each instance runs the same treatment as is used to adorn the neck of the accompanying capital. These pilasters are given a moulded base, much the same as that employed on the columns, although the members are ornamented with more horizontal lines than are used on the column base. It will be observed that these pilasters follow the same general treatment as those used with the Greek Doric Order; and they should be compared, in all the examples illustrated, with the columns, shown elsewhere, with which they were used.

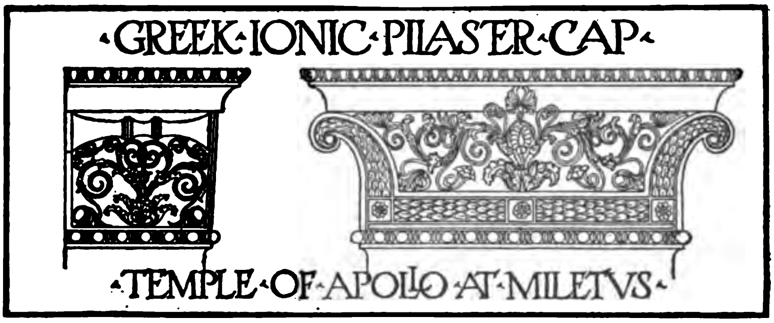


Fig. 94.

Fig. 93 shows side by side a comparative column and pilaster treatment from the Temple of Minerva at Priene. This illustrates the size of the pilaster as regards the column diameter at the neck and base. As will be seen, it approximates a mean between these two dimensions. The capital of the pilaster is shown one-half on each side of the center line, to indicate the treatment both of the end and of the face. The same treatment was applied to the square detached columns or piers employed in this temple. In Fig. 94 are shown the end and face of a pilaster cap from the Temple of Apollo at Miletus. These pilasters, each ornamented differently, were used attached to a wall surface, and were connected with each other by a carved and ornamented frieze. The end of the pilaster, therefore, is shallow in width and depth, and only the face is regarded in reference to the column width.

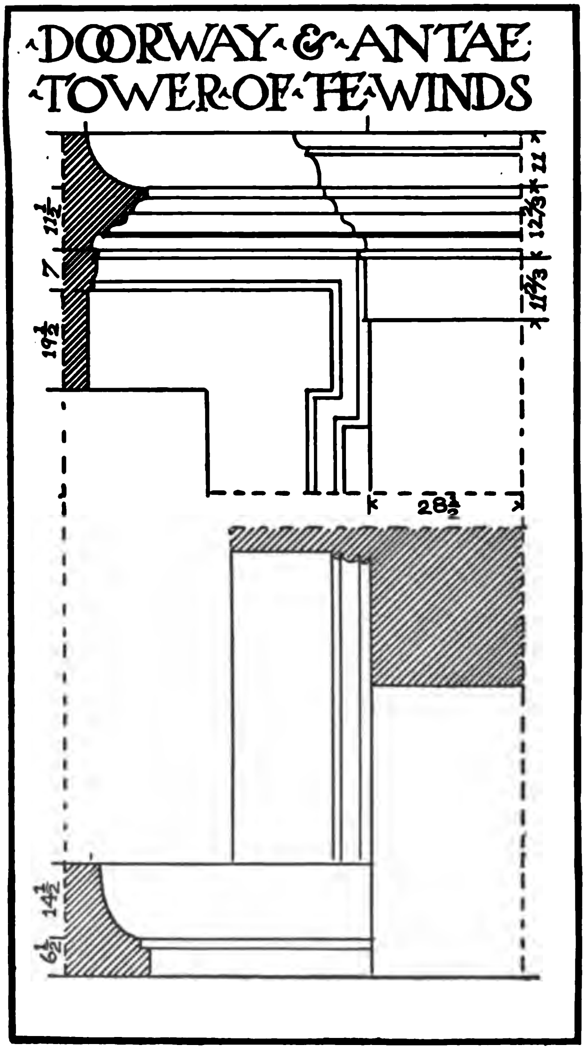


Fig. 95.

Corinthian Pilasters. Of the use of pilasters with the Greek Corinthian Order, we have only one authoritative instance—that of the Tower of the Winds at Athens. There is no pilaster used with the Corinthian Order on either of the other examples, the Monument of Lysicrates or the Tholos at Epidauros; and in this example from the Tower of the Winds, illustrated in Fig. 95, the pilaster was used only on each side of the entrance doorway to receive the entablature returning from the small pedimented porch, which is more fully shown in the illustration of this building in Fig. 74.

EXAMINATION PLATES

In addition to the following examination plates, the student is advised to make such sketches or drawings of the different parts of the Order from the descriptions and references in the text as will enable him to thoroughly understand their different parts and their general forms and proportions.

The following plates are to be drawn out to the required sizes, as indicated in the following section. The plates should be carefully and thoroughly drawn out in pencil before attempting to ink them in. All the large plates are to be drawn on a half-sheet of Strathmore smooth-finish or Whatman's hot-pressed drawing paper, with the border line laid out to the size given, 12 by 16½ inches; and the paper should be trimmed with a half-inch border outside this line, making the paper size of the finished plate 13 by 17½ inches.

The measurement figures given on the various plates may be omitted from the drawings made by the student.

The titles of the plates are to be lettered, generally speaking, in the same fashion as the lettering on the principal drawings illustrating the foregoing section. The student should first be careful to place pencil guide-lines at the top and bottom of his letters, both for capitals and small letters.

The date, the student's name and address, and the plate number should be lettered on each plate in one-line letters, such as are used in the title of Fig. 73.

PLATE A

The student is to draw out to the size of 12 by 16½ inches a plate showing Greek moulding sections. This plate is to include all the mouldings described in the text on pages 109 to 113; and he is to letter each moulding with its proper name. He is to utilize mouldings from the plates illustrated in this Instruction Paper, and may arrange them in the general fashion shown in Fig. 46, obtaining another perpendicular row of mouldings in addition to the eight illustrated in that cut.

PLATE B

An order plate showing the Greek Doric column and entablature after the fashion shown in Plate XXXVIII, is the second examination plate required. This plate may be carefully copied by the student, with the outline enlarged and drawn to the size of 12 by 16½ inches.

PLATE C

The student should draw out the complete Greek Doric column at its entire height, as shown in Plate XXXVII, at the size of the small detail of the cap at the bottom of this same plate.

PLATE D

The student is to draw the façade of the Propylæa on a plate 12 by 16½ inches in size, and is to include sections of the principal mouldings and a detail of the capital, supplying his sections, etc., from the information given on the plates illustrating the Doric Order. The façade of the Propylæa is shown in Fig. 88 at a small scale. This is to be enlarged, retaining the same proportions.

PLATE E

An order plate showing the Greek Ionic column and entablature after the fashion shown in Plate XLI, is the fifth examination plate required. This plate may be copied by the student, with the outline enlarged and drawn to the size of 12 by 16½ inches.

PLATE F

The student is to draw out at the size of 12 by 16½ inches one or the other of the Ionic capitals shown in Plates XLII or XLIII, omitting the measurement figures there given.

PLATE G

The student is to draw out to the size of 12 by 16½ inches the detail from the Erechtheum shown on Plate XLV, taking special pains to retain the character of the moulding sections and carving shown in the original.

PLATE H

The student is to draw out on a plate 12 by 16½ inches in size, a Greek Ionic pedimented façade of four or six columns. It is suggested that he take one of the porches of the Erechtheum for a model. This building is shown in plan in Fig. 67; while the details of the entablature are shown in Plate XLV, and the column is drawn out to a large size in Plate XXXVII. The north porch of this building is further shown in Plate XLIV and Fig. 68.

PLATE J

An order plate showing the Greek Corinthian column and entablature after the fashion shown in Plate XLVII, is the ninth examination plate required. This plate may be enlarged and copied by the student within the outline size of 12 by 16½ inches.

PLATE K

The student is to draw out the Corinthian and Doric columns and entablatures from the Tholos at Epidauros shown in Plates XLVIII and L, showing the columns at their full height, and including on some part of the drawing the three sections of ornament shown at the bottom of Plate L. Sections of the two entablatures should be included.

PLATE L

The Greek Doorway for the Erechtheum, shown in Fig. 84, is to be drawn on a plate 12 by 16½ inches in size, and to include in the door opening the details shown in Fig. 83 at double the size there drawn. These details are to be inserted in place of the window shown in Fig. 84.

FREEHAND EXAMINATION SKETCHES

The student is required to draw in ink and freehand the following sketches, modeling them upon the one shown in Fig 73, and making their outline about 4 by 5½ inches in size. These drawings are to be made freehand from the plates included in this Instruction Paper, and are to show the proportions and carving with particular care.

PLATE M

A capital of the Greek Doric column shown in perspective, somewhat after the fashion of the columns in the Frontispiece.

PLATE N

A sketch of a Greek Ionic capital in perspective, using any one of the styles shown in the Instruction Paper, as a model.

PLATE O

A sketch perspective of a Greek Corinthian capital, employing any one of the three types shown.

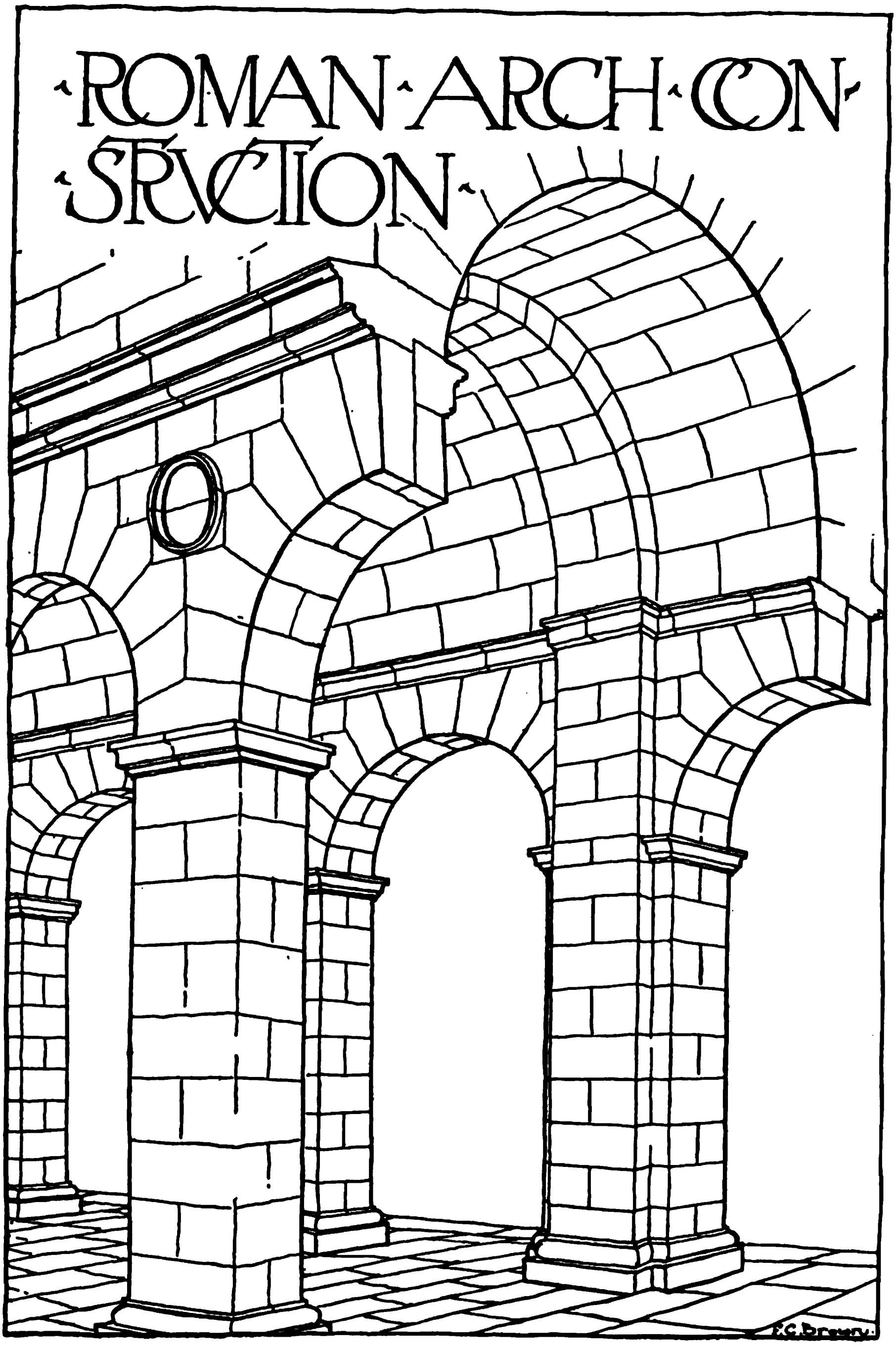
PLATE P

The acanthus leaf shown in Fig. 69 is to be drawn at the size of one of these sketches, either in perspective or, as in the figure, in direct elevation.

PLATE Q

Any one of the stele crests shown in Fig. 86 is to be drawn out freehand to the size of 4 by 5½ inches to agree with the other sketch plates, and is to be submitted along with them for correction.

These six freehand sketches are to be made by the student when studying the various Orders and should all be sent to the School at one time when completed.



ROMAN CONSTRUCTION.

STUDY OF THE ORDERS

PART III

THE CLASSIC ROMAN ORDERS

Origin of Roman Architecture. While the architecture of Egypt, as well as that of other early civilizations, probably contributed toward the style that was eventually produced and defined by the Greek artists, the Romans, by their conquest of Greece, at once acquired a unified and perfected architecture at almost the full height of its development. Not only were the buildings and architectural forms themselves perfected, but they were then being produced by the designers, architects, and artists who, as members of the subjugated nation, became the subjects of the more powerful race.

Thus the Romans became possessed of a perfected, if exotic, architecture; and we cannot therefore be surprised to find that the early Roman buildings were often Greek, in both their design and workmanship. This architectural style, although soon permanently affected in its development by Roman civilization, yet at first showed but slightly the influence of the arts of other foreign nations or races. The one notable exception was as regards the Roman adoption of the arch as the most important structural principle of their buildings.

The Arch and Vault. In taking up the progress of architecture at the period when the Greeks and other early nations yielded to the succeeding ruling race, the Romans; the difference in the vital principles underlying the structural elements of these two periods must be thoroughly understood. Throughout the Greek work we find that the lintel or supporting beam of wood or stone seems to be the only method of construction upon which they depended to any extent. The Romans, on the contrary, adopted the arch (see Fig. 96) to carry across all openings; and they further extended its use, in the form of a vault, to the covering of rooms or voids which they desired to roof in. The principle of this vaulted arch they had evidently borrowed directly from the Etruscans; a people of Asiatic origin living in northern Italy some ten or twelve centuries before Christ.

The arch itself dates back to a much earlier period. There are examples in Egypt of brick barrel vaults composed of three rings of *voussoirs*, built about 3500 B. C.; but the Etruscans, by their use of cut stone instead of brick for this purpose, evidenced a much higher engineering skill, at least so far as an understanding of *stereotomy* was concerned. This same people continued to employ a form of construction consisting of overlapping layers of stonework, which may only indicate the transition from the lintel to the arch principle, or which may have been devised solely to imitate the interior appearance of a rock-cut tomb. This same scheme, we know, was used by the Egyptians, Assyrians, and Pelasgians, although it is best shown in the Etruscan tombs; and, because of the large size of the blocks of stone employed, it is frequently referred to as "Cyclopean" masonry.

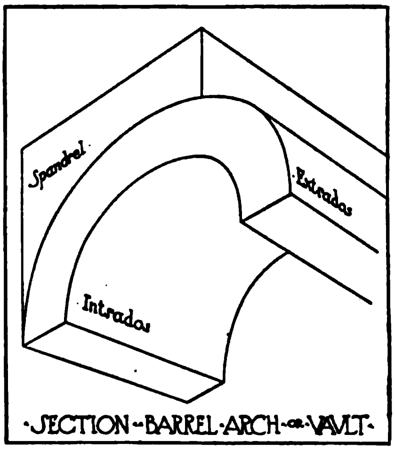


Fig. 96.

These tombs, round in plan, were constructed of layers of stonework, each layer projecting over the layer next below, until they met at the crown or apex of the resulting vault. This circular construction was then covered with earth or gravel, and the angles of the stone on the interior were dressed down to an even surface, suggesting by its outline the segment of an arch, as shown in Fig. 97. These tombs were built by the Pelasgic race in Italy probably between the years 1800 and 1500 B. C.; but it remained for the Etruscans finally to define the principle of the voussoired arch of stonework. This principle the Romans borrowed and probably developed to a much higher degree than had ever been considered possible by its originators.

By adopting this principle, the Romans seldom required the column as a support for the lintel in the way that the Greeks had heretofore used it; and, as the arch required a heavier and stronger supporting member than the column in order to resist the thrust which it originated and transmitted, they were compelled to revert to the more solid pier of masonry for this pupose, which at once materially modified the appearance of their buildings. (See frontispiece.)

Combination of Arch and Lintel Construction. The Romans, moreover, acquainted with the civilization and the architecture of the Greeks, demanded a more architectural effect than had satisfied the Etruscan builders; and therefore they adapted to their own purpose the architectural forms and Orders originated by the Greek artists, and even used them for ornamenting the otherwise plain wall surfaces of their various structures, in a way that the Greeks had never done. They employed a column, or partial column, placed against a plain wall surface—or *engaged*, as it is called, to the wall behind; as in the Tabularium, where an arcade on the side towards the Forum was decorated with engaged Doric columns, carrying an entablature. This is the earliest Roman instance of the use of the Orders in this fashion, and dates

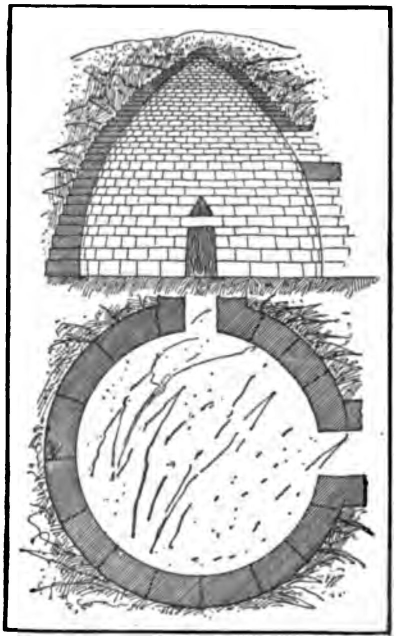


Fig. 97. Horizontal and Vertical Section of Pelasgic Arch Construction.

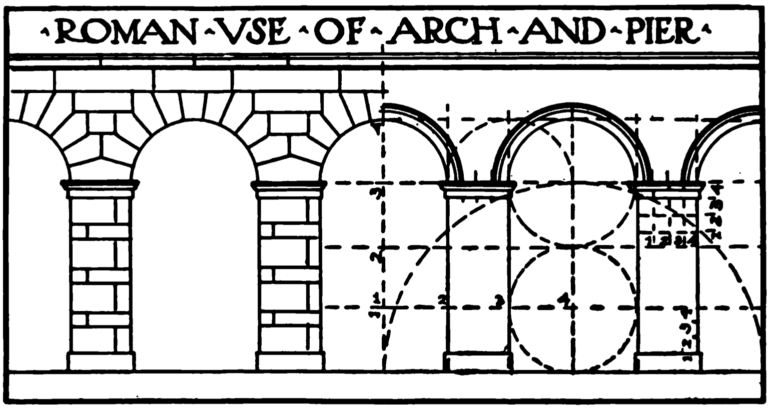


Fig. 98.

from about 78 B. C. The Temple of Fortuna Virilis (Fig. 123), in which the columns were engaged, with a plain wall surface between, after the fashion possibly suggested by one or two of the earlier Greek structures, is of a date earlier than the arcade of the Tabularium.

A reference to Figs. 98 and 99 will show the radically different appearance given by thus applying an Order of architecture as an ornament upon the face of a method of construction complete in itself. In Fig. 98 is shown a simple arcade supported on plain piers (A, Fig. 100); and in Fig. 99 is drawn out a similar arcade ornamented by the application of the Doric Order to the face of these plain piers, after the fashion shown in plan at B, Fig. 100.

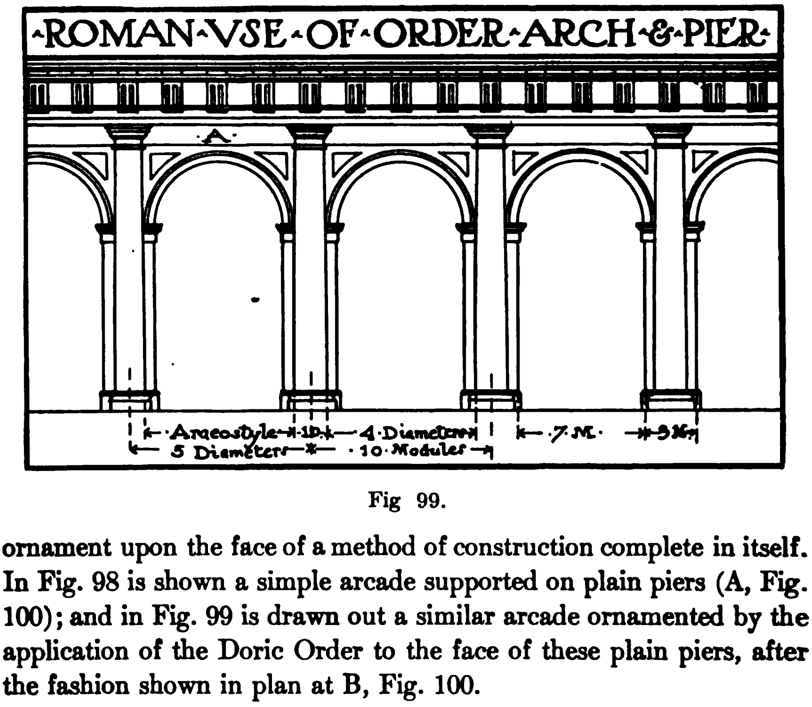
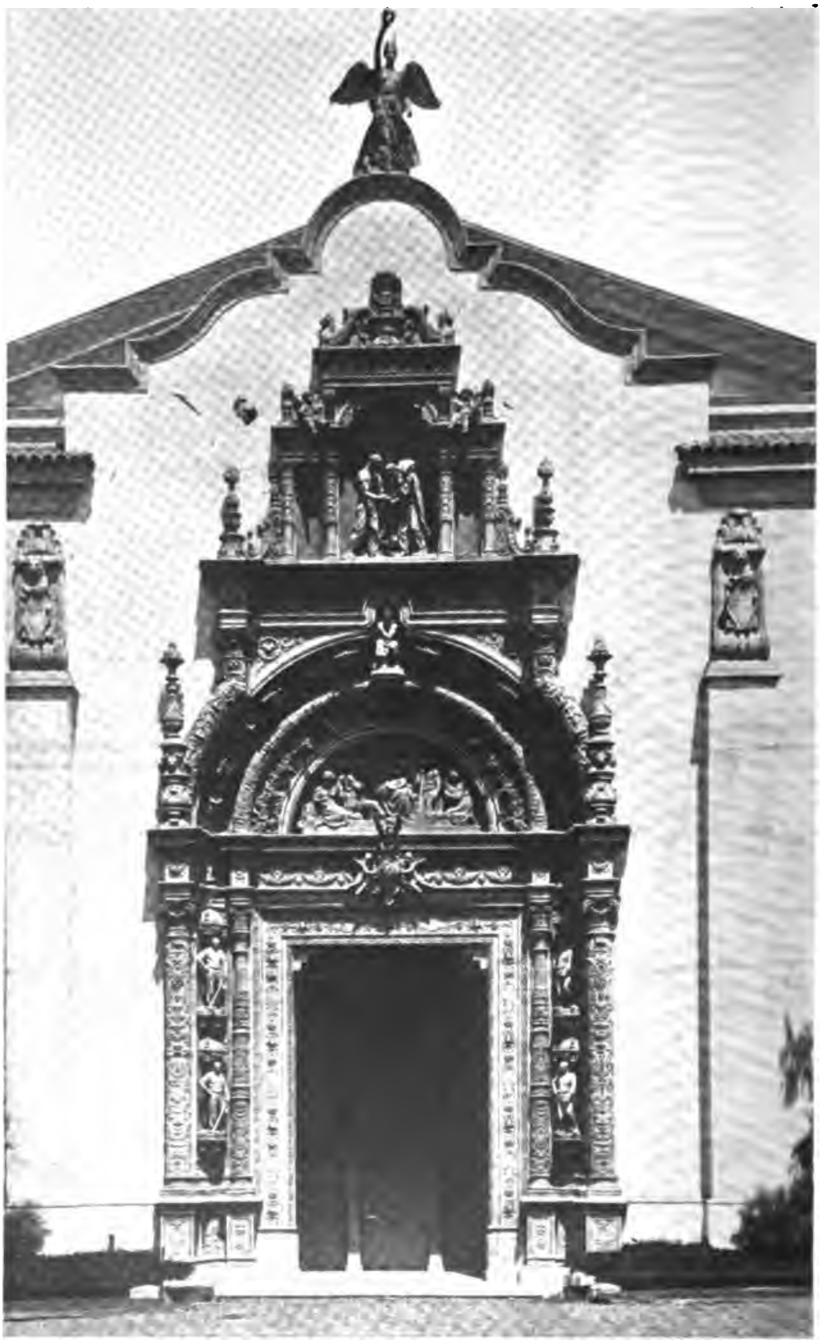


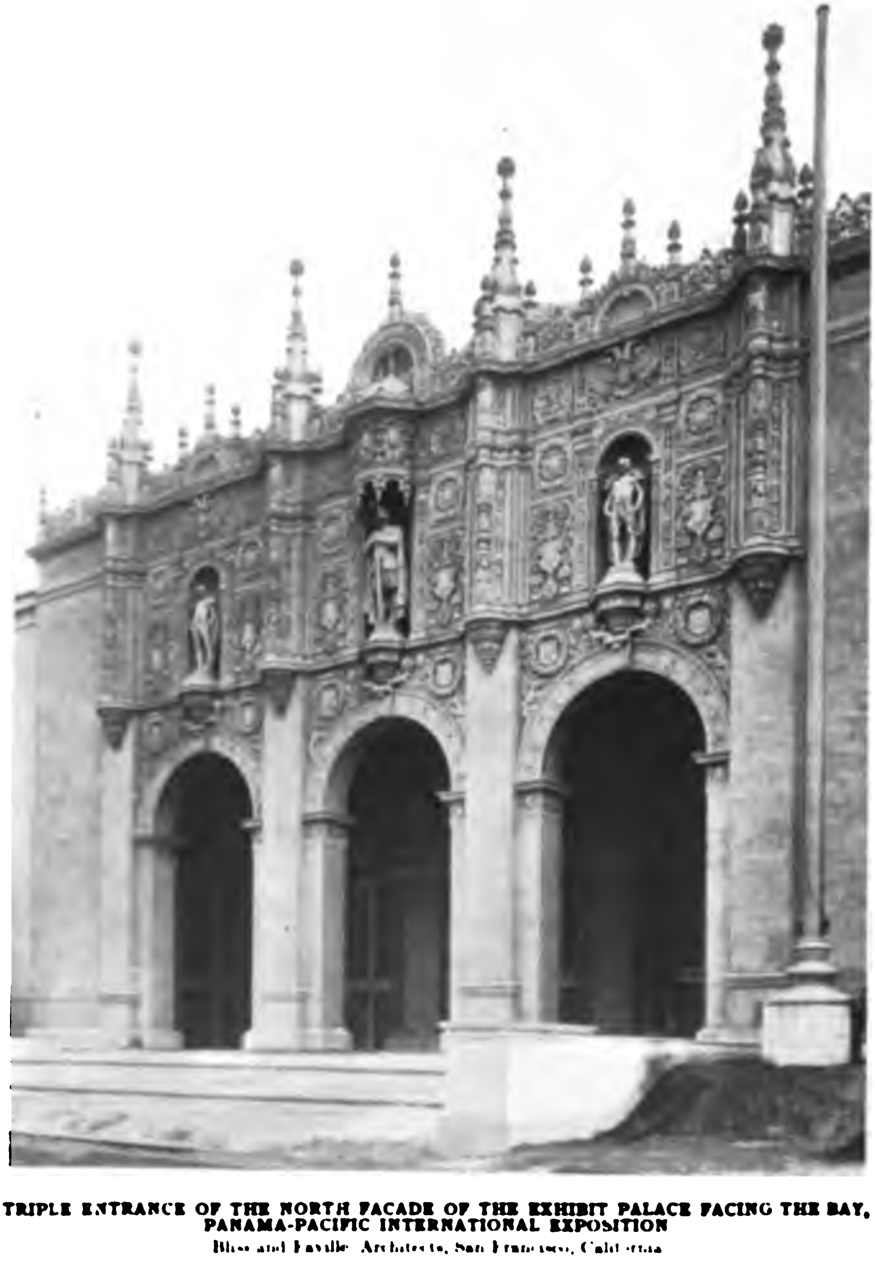
Fig 99.

This use of the Order produces an effect very different from that of the one or two examples of the use of attached columns already existing in Greek architecture, although it is probable that these may have suggested the application of the column to the face of a plain wall; a method of which the Romans had already availed themselves in the Temple of Fortuna Virilis at Rome. This example may easily have been copied from the similar use of the Order in the large Temple of Jupiter Olympus at Agrigentum, or in the Monument of Lysicrates at Athens.

In both these Greek structures the columns are apparently planted

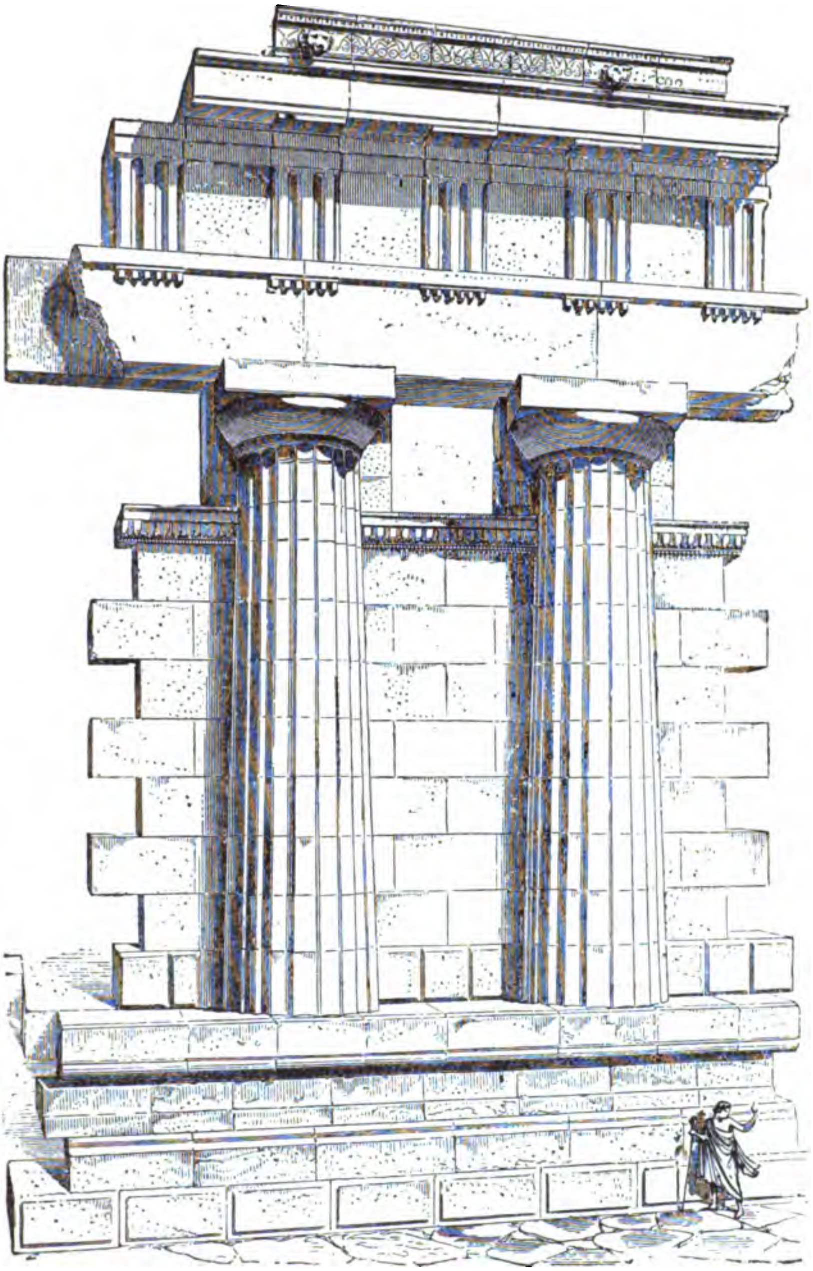


DETAILS OF MAIN SOUTH PORTAL OF THE PALACE OF VARIED INDUSTRIES, PANAMA-PACIFIC INTERNATIONAL EXPOSITION
Bliss and Faville, Architects, San Francisco, California



TRIPLE ENTRANCE OF THE NORTH FACADE OF THE EXHIBIT PALACE FACING THE BAY, PANAMA-PACIFIC INTERNATIONAL EXPOSITION

Bliss and Faville Architects, San Francisco, California



Basilica of the Giants, Temple of Zeus, Agrigentum, Sicily.
Showing Greek "engaged" columns.

against the face of a connecting curtain wall. As a matter of fact, the columns are *entire* in both these buildings, the wall itself being built up between and behind them, with the face hollowed out so as to receive the shaft, thus suggesting the addition of the wall at a later period as a screen between the columns without affecting the lintel principle upon which the building was probably first designed. In the Temple of Jupiter Olympus, the addition of this wall was probably made necessary by the fact that the tremendous scale of the building made the span covered by the lintel of a length too great to be carried safely in this fashion, and so the wall was introduced as an additional method of support. Possibly something of this feeling may have caused the use of the wall between the columns in the Monument of Lysicrates, though for different reasons. The plan of this monument being circular, it may have been thought that the overhanging projection of the entablature between the supporting columns would weaken the lintel, either actually or apparently, so that it might require additional support at its point of greatest projection.

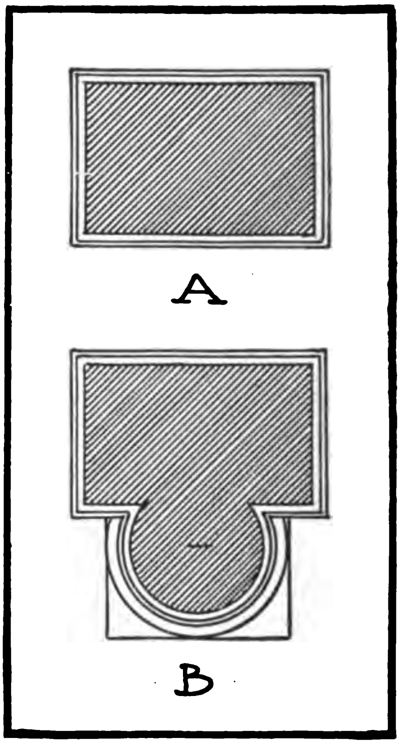


Fig. 100. A—Roman Pier.
Engaged Column and Pier.

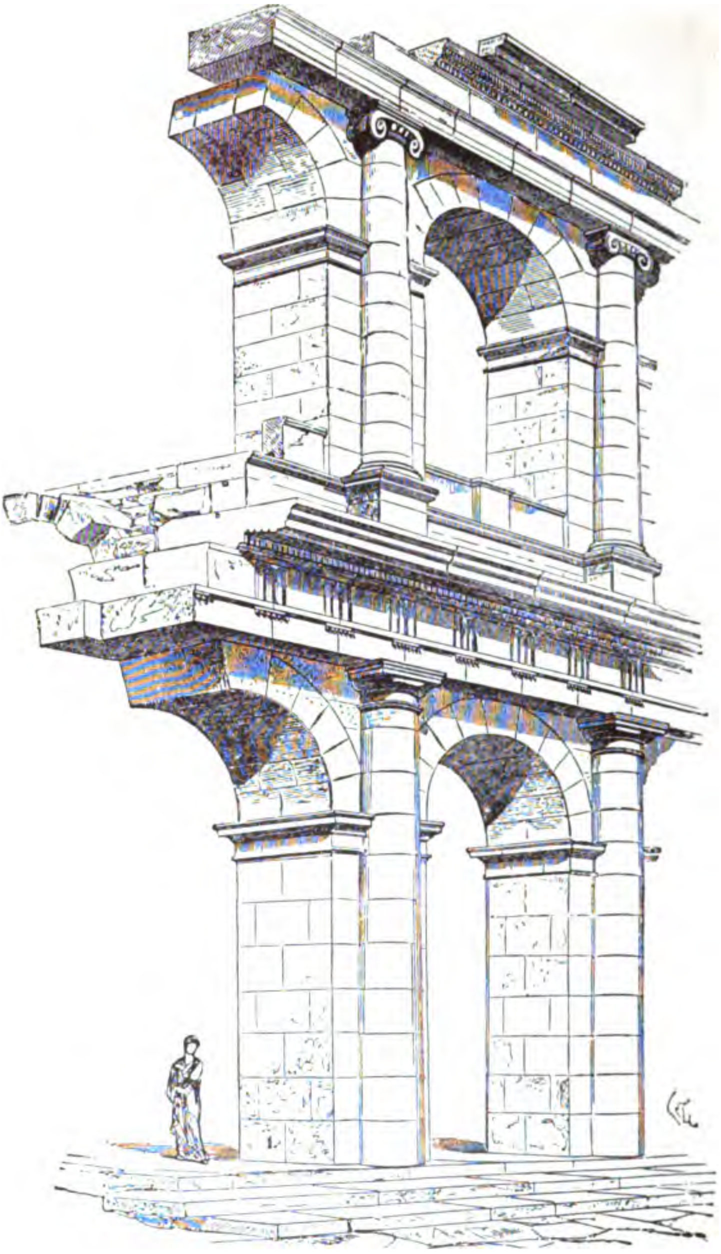
But the difference between the use of the column in this fashion, attached to a plain curtain wall, and its use placed against the face of a pier between arches, as the column was employed in the arcades of the Tabularium and later in the Theater of Marcellus and the Colosseum, suggests a great advance in the architectural effectivenesss of its use and in its close identification with the more constructive architecture of the Romans, even though there is but slight difference in the principle of its application.

the arch principle from the Etruscan builders, and their use of the Greek-developed Order as a mere ornament applied on the face of an arch-supported wall, the Romans further varied—in one important particular—their employment of the Classic Order. Where the Greeks, almost without exception, had used one column—even of gigantic size where necessary—to carry from a low basement or stylobate to the entablature that acted as the crowning member of the building, as well as of the Order used on its exterior façade; the Romans did not hesitate to superimpose one Order upon another, making two or more stories, one over the other, each carrying a complete Order upon its face. The derivation of this idea is possibly traceable to some of the Greek temples, in which a second Order was sometimes used on the interior to support the gabled roof covering the structure, and, incidentally, to admit of a higher central aisle. For this purpose they used either small columns, as at Pæstum (the Order is here the same in style and treatment as the one below, being merely smaller in scale), or, more often, a human figure placed upon the face of a plain pier. The idea of superposition, as developed by the Romans, soon became an important part of their architectural treatment; and in the later revival of Roman architecture which occurred during the Renaissance, this method of treatment was frequently used.

Use of Orders for Secular Buildings. The Romans, in their use of the Order, employed it much more generally than did their predecessors; for, while the Greeks restricted its use substantially to the temples erected for the worship of their various gods, the Romans did not hesitate to use the same architectural forms for buildings devoted solely to pleasure or for the dwellings of their rulers.

Plan of Roman Temples. The Romans followed, in their temples, the general form already used in the Greek work, although they seemed more partial to circular buildings than were the Greeks. The circular temples may have been suggested by the Etruscan tombs, and the system employed for their roof vaulting does something to strengthen this idea. The simple, rectangular Greek plan they also varied and elaborated by adding and combining other rectangles into larger groups, with the result that the Greek simplicity of effect was soon entirely lost.

In Rome, on account of the restrictions in location occasioned by the small area of the city available for the purpose, and the over-crowd-



Theater of Marcellus, Rome.
Showing Roman use of engaged and superimposed columns.

the arch principle from the Etruscan builders, and their use of the Greek-developed Order as a mere ornament applied on the face of an arch-supported wall, the Romans further varied—in one important particular—their employment of the Classic Order. Where the Greeks, almost without exception, had used one column—even of gigantic size where necessary—to carry from a low basement or stylobate to the entablature that acted as the crowning member of the building, as well as of the Order used on its exterior façade; the Romans did not hesitate to superimpose one Order upon another, making two or more stories, one over the other, each carrying a complete Order upon its face. The derivation of this idea is possibly traceable to some of the Greek temples, in which a second Order was sometimes used on the interior to support the gabled roof covering the structure, and, incidentally, to admit of a higher central aisle. For this purpose they used either small columns, as at Pæstum (the Order is here the same in style and treatment as the one below, being merely smaller in scale), or, more often, a human figure placed upon the face of a plain pier. The idea of superposition, as developed by the Romans, soon became an important part of their architectural treatment; and in the later revival of Roman architecture which occurred during the Renaissance, this method of treatment was frequently used.

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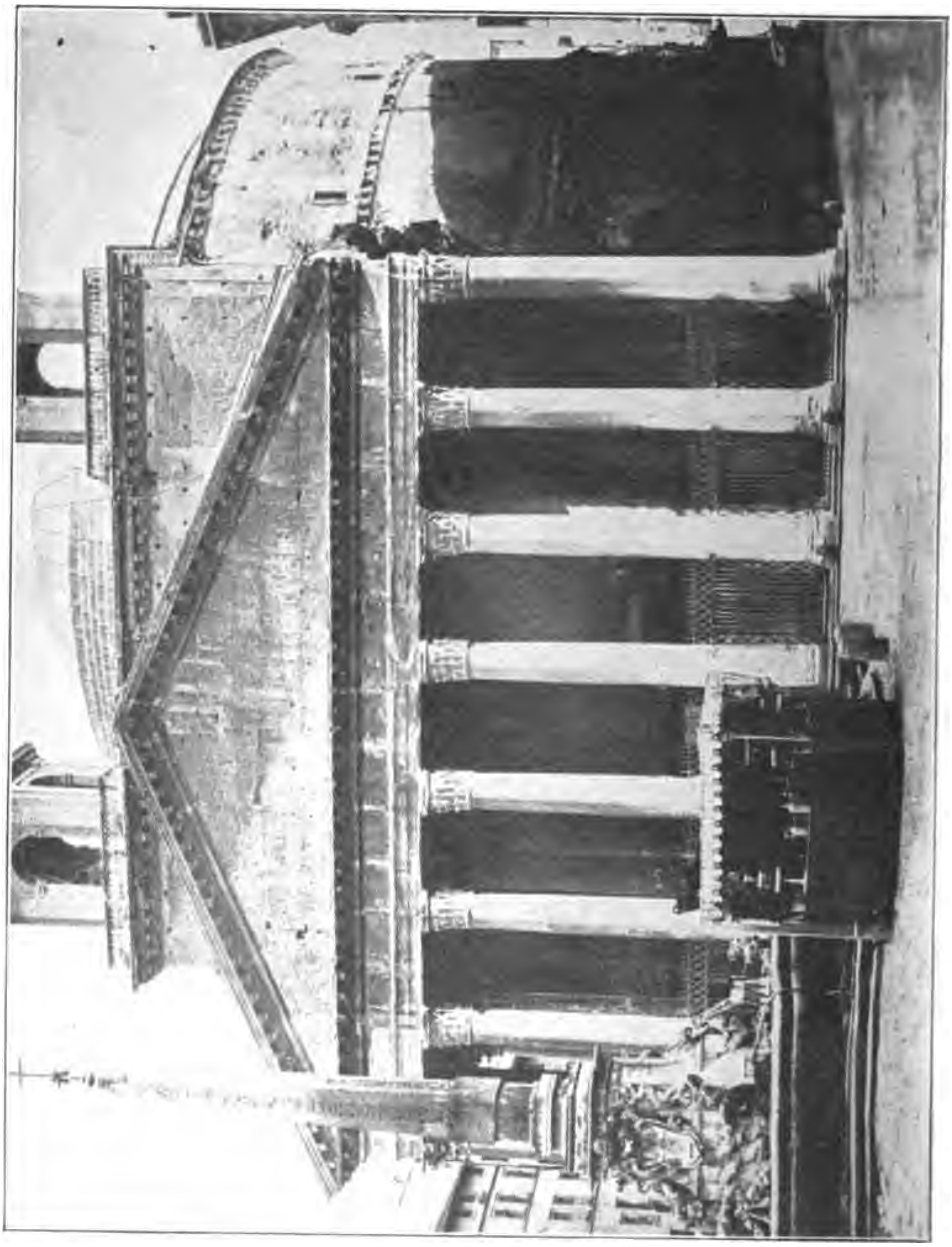


Fig. 109 Exterior of Pantheon, Rome

ing of this area with monumental buildings of every kind, the principal temples seldom attain the development of plan given by the Greeks to their temple structures. The Roman building is almost invariably seen only from a point directly in front; and this accounts for the greater importance given by the Romans to the entrance portico, its increased depth and greater number of columns, and the comparatively slight attention bestowed on the sides and rear of the building. The plan also, in depth, very seldom attains to the dimensions of the less restricted Greek temple plans; and it is important, in estimating the effect of the Roman temple architecture, to comprehend not only the restriction of its plan, but also its relation to the surrounding architecture, and especially to the natural or artificial restrictions imposed by the contour of the ground where it was placed.

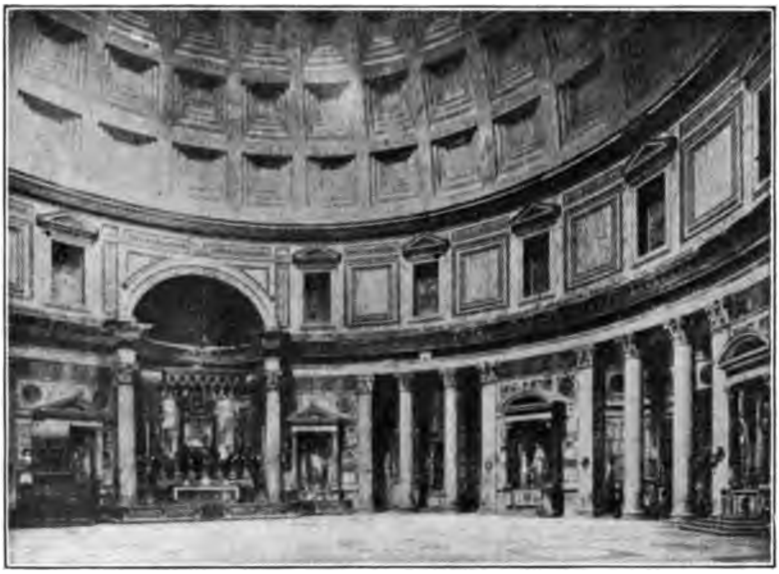


Fig. 103. Interior of the Pantheon, Rome.

The Romans often employed the lintel principles of the Greeks in their use of columns for porches at the entrance to their buildings and temples, or to support a wall over a recess. Both of these cases are well shown in the exterior and interior treatment of the Pantheon at Rome (Figs. 102 and 103), in which are combined the circular temple, at a gigantic scale, with the pedimented porch or cella of a columnar, rectangular edifice.

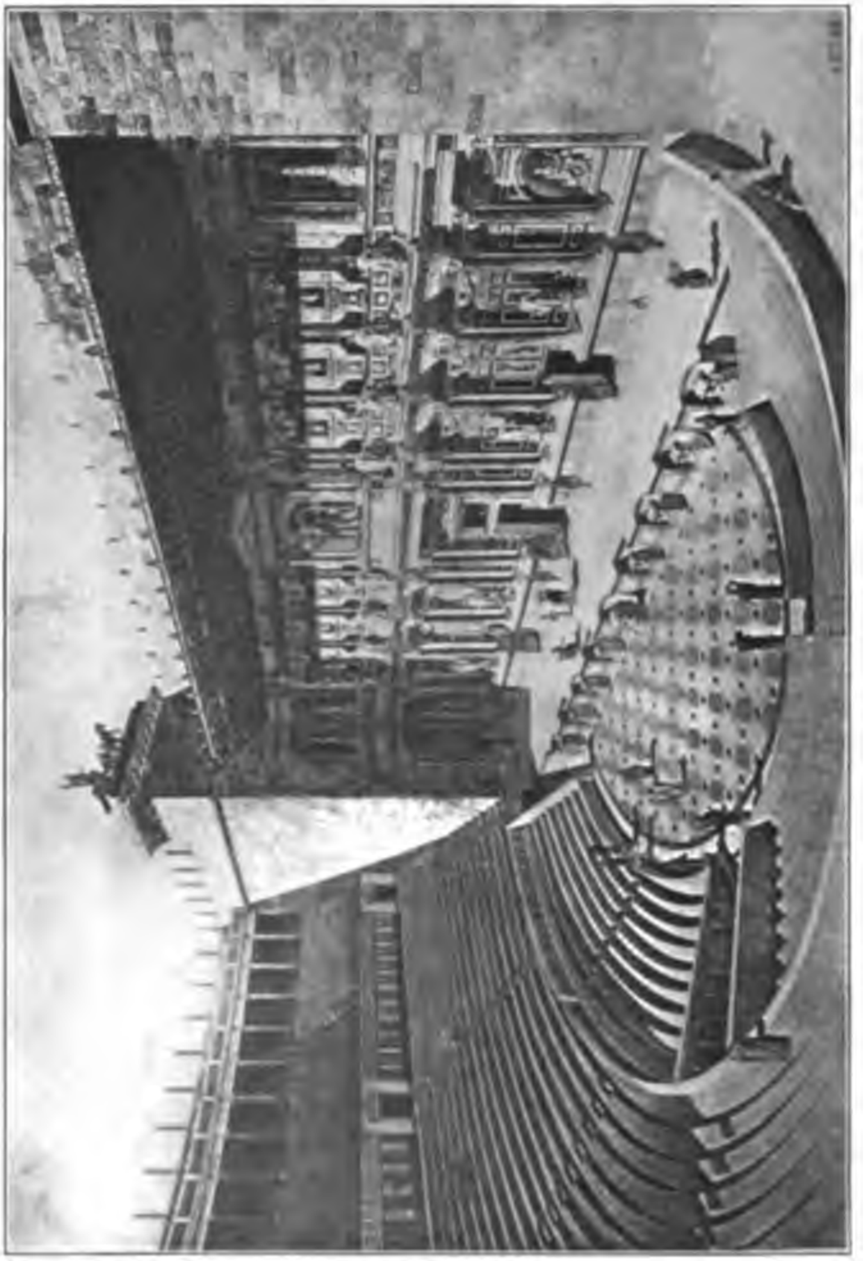
The portico of the Roman temple was generally approached by a flight of steps, and probably it was the lack of space in front of the building that first occasioned these steps being carried in under the portico itself and between the columns. This would occasion a sort of buttress, or projection of the platform, in order to support the column with its base on a level with the main floor of the porch, and would suggest (in front elevation) the effect of a pedestal placed under the column.

The Roman Theater. The Greek theater and stadium, situated as they always were on the natural slope of some hill, demanded no consideration of exterior treatment, but rather a nice selection and use of the natural contour of the ground. The Romans, on the other hand, disregarded entirely the setting of their buildings in such a natural amphitheater, and built them without any consideration of their conformation to the landscape. This custom required a treatment of some sort for the enormous screen of wall used to support and enclose the tiers of seats for the spectators. As a result we have such impressive monuments as the Colosseum in Rome and the Amphitheaters at Arles and other places.

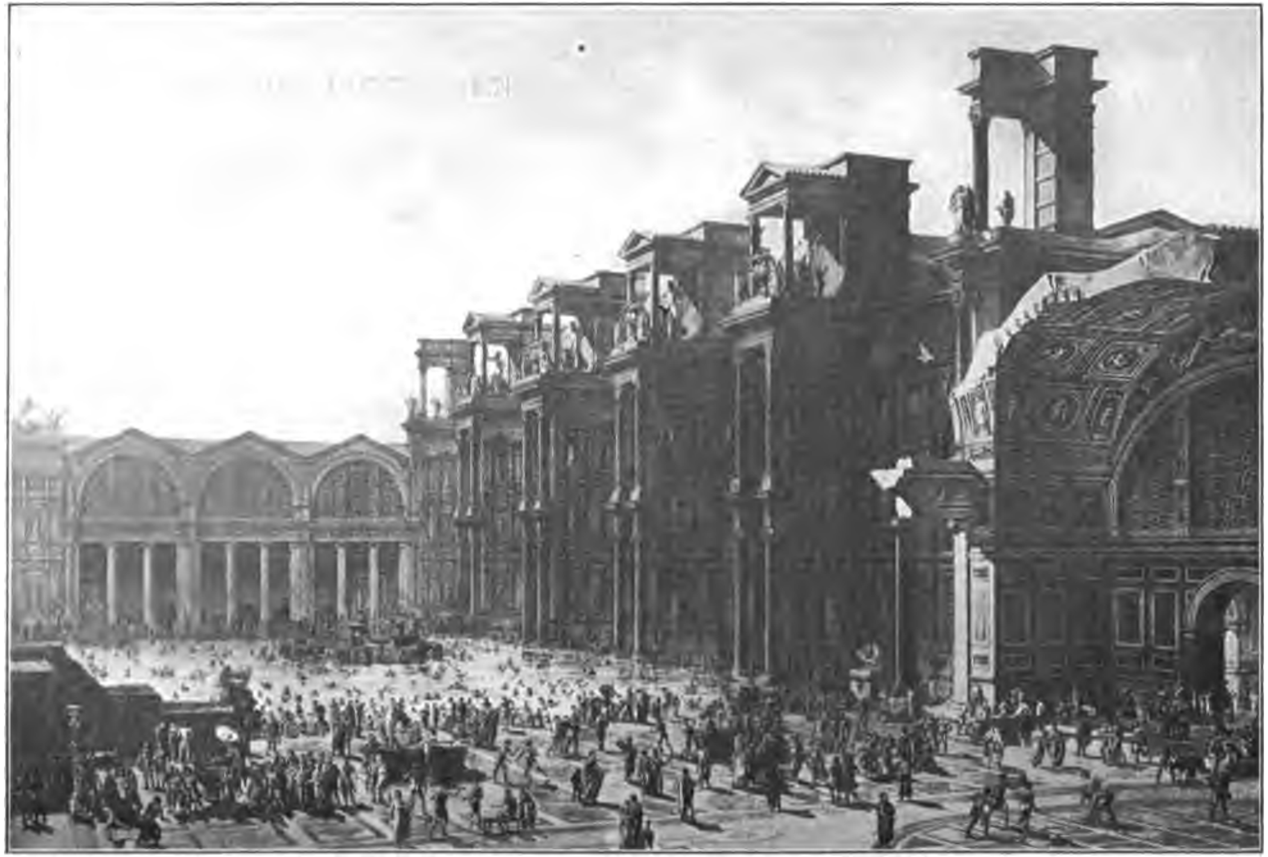
The Greeks erected some buildings of considerable size, evidently intended to be used as gymnasiums and having baths as a minor part of the plan. These buildings may in turn have served as the first suggestion for the enormous Baths afterwards constructed by the Romans. Some of the most interesting Roman remains are the ruins of these Baths, of which it is almost impossible to gain any adequate idea of their immense size and magnificence, even from the careful restora- of the archæologists.

The Basilica. The plan of the basilica or Roman law court was afterwards adopted by the Christians as the arrangement best suited tor their places of worship,and it is most instructive to trace the gradual growth of this simple plan into the colonnaded cross form that afterwards became customary.

Character of Roman Architecture. Roman architectural monuments are all imbued with a feeling for tremendous size, a straining at magnificence, almost a theatrical effect; and are pompous and grandiose in contrast to the work of the preceding civilization, in which refinement and taste, instead of a feeling for size or display, were the most distinguishing characteristics.



Interior of Roman Theater.
Restored by P. André and H. d'Espouy.



Interior of Baths of Diocletian, Rome.
Restored by E. Poulin.

This difference in character caused a corresponding difference in the effect of Roman architecture, which was emphasized by the greater inclination of pediment and steeper pitch of the roof; an impression which was further strengthened and defined by the totally different character and treatment in plan and of Roman carving and detail.

The first Roman buildings were undoubtedly erected by Greek workmen, under the supervision of Greek architects, to meet the demands of their conquerors. This is easily proved by the character of all these early remains, such as those at Cora, at Pompeii,and in the other early Roman cities. Later, however, when the actual workmanship was perhaps left to the execution of slaves, sometimes Greek and sometimes of other origin, without proper supervision, and when the architectural precedents furnished by the Greeks had become more remote, as to distances of both time and place; a general decadence in architectural purity, exemplified by the lack of refinement in design, became everywhere prevalent throughout the Roman Empire and the countries under its influence.

The pomp and luxury which had overtaken the nation expressed itself architecturally in the over-luxuriance of carving and ornament, repressed neither by taste, refinement, nor considerations of expense, that very soon became characteristic of Roman architecture. This character quickly evidenced itself throughout all the colonies and dependencies of the Empire, and affected the otherwise local expression of the prevailing architectural style native to the district. It was this tendency that was responsible for the evolution of the Order termed the *Composite*, which was adapted from the Corinthian form with the sole intention of allowing an excuse for more ornament and carving than even that elaborate Order supplied.

In this decadence, sight was soon lost of all the inherent natural expression embodied in the Greek Orders at the time when the Romans overcame and arrested the progress of Greek civilization; and consequently it soon becomes difficult to trace the growth of the Roman column from either stone or wood beginnings. The column, in attaining to a regularity of type, frequently becomes colorless and flaccid, and has lost much in individuality and character. This gradual vulgarization was attended, however, with an increased surety and facility in the employment of the various compositions of columns and colonnades. The very process of reducing the Orders to a "rule," with its inevitable loss of artistic expression, yet caused them to attain an average that made their use possible—with a certainty of not going far wrong—by individuals of indifferent genius or architectural training.

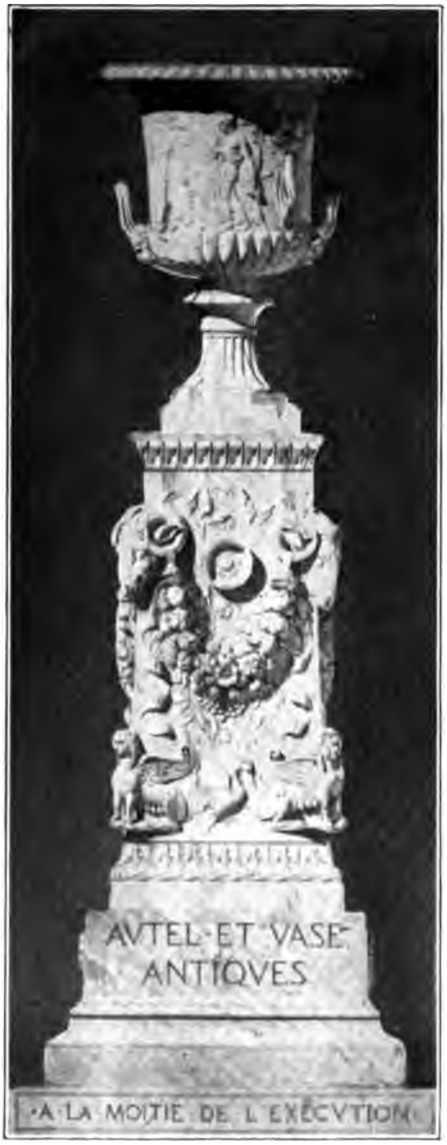
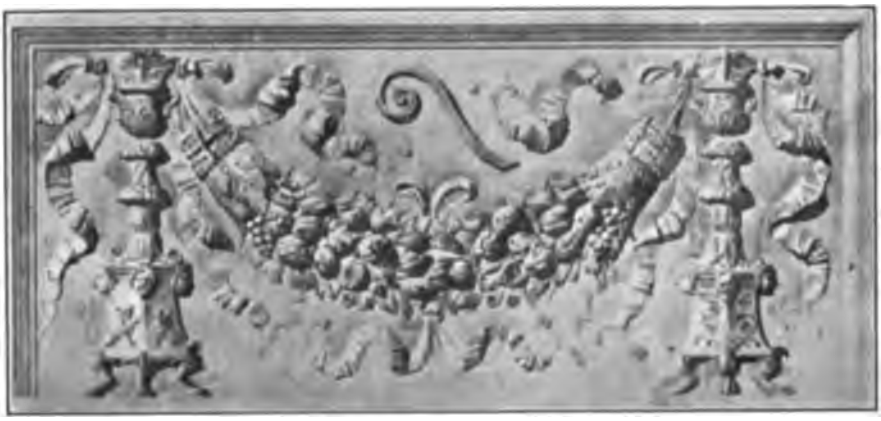
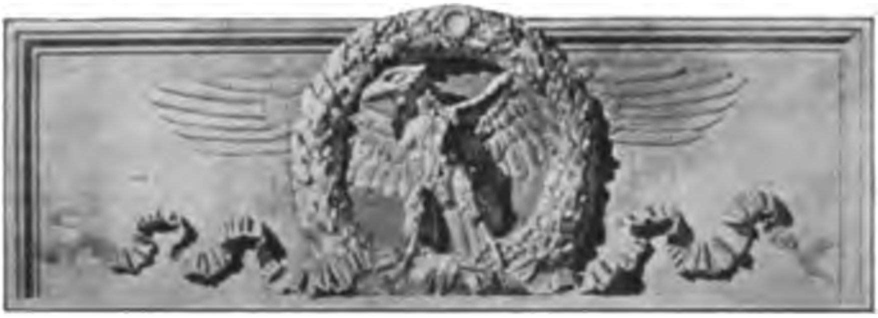


Fig. 104.

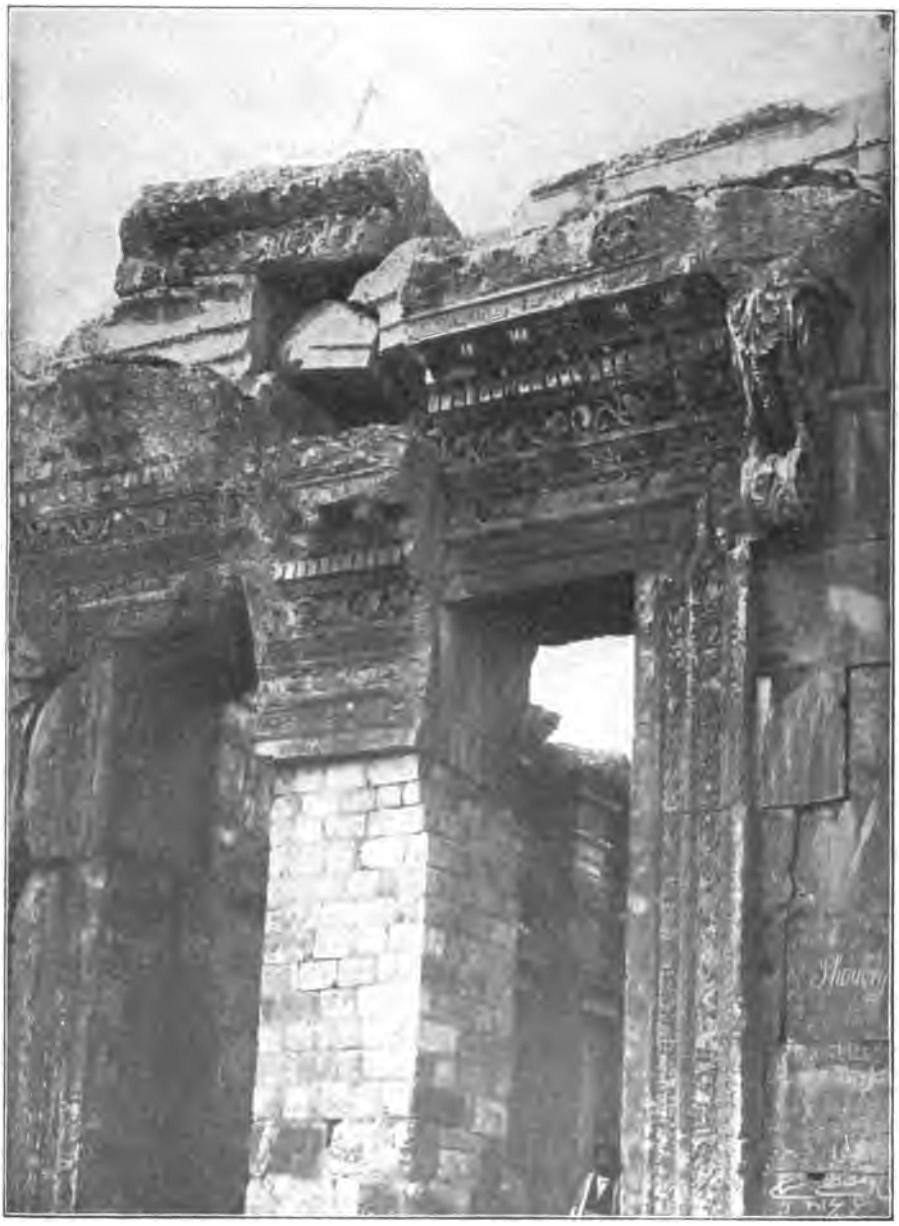
This gradual degeneration is well exemplified in the cutting of the fluting of the column shafts. Where the Greeks used their best ingenuity in emphasizing, sharpening, and bringing out the raised arris which separates the flutings of their columns, the Romans, by careless cutting, soon allowed the flutes to become shallow, with the result that the fillet edges were not sharply defined and the entire shaft of the column lost much of its character. At the same time that the carving of the moulding faces loses in character and beauty of detail, it grows more uninteresting, and in fact meaningless, and is used with less discrimination, feeling, and common sense, until the carving is eventually so placed as in most instances to destroy and confuse the meaning of the various moulding outlines, themselves now much debased in type.



Decorative Carved Panel.
Festoon from Temple of Vesta, Tivoli.



Decorative Carved Panel.
Eagle and Wreath from Forum of Trajan. Rome.
Now in Church of SS. Apostoli, Rome.



Roman Doorway.
From Corinthian Temple of Jupiter at Baalbec, Syria.

The Roman moulding sections followed the same course. Starting with the refined Greek outline, they became coarse, and rapidly deteriorated. Where the Greek demanded a fine gradation and subtilty of contour, the Roman was satisfied with broad contrasts of black and white, of sunlight and shadow, with little sub-gradation of tone or refinement in outline. The result is easily traceable throughout all Roman architecture. The outline of the echinus moulding of the Greek Doric column, at first imitated by the Romans, soon loses its character, until, in the Colosseum, it is nothing more nor less than a crude quarter-round in section. The volute of the Roman Ionic capital is crude when compared with the refined moulding and more minute working out of its Greek prototype. It was but occasionally that, in the carving of some bit of elaborate detail, the pleasure of the artisan in expressing his skill caused him to produce a design of interest and charm (Fig. 104); but this ornament is almost invariably given a naturalistic treatment, quite at variance with the more decorative and conventional rendering with which the Greeks endowed even the simplest bits of their architectural ornament.

In adopting the Greek Orders, the Romans were evidently much more partial to the Ionic and Corinthian forms; the latter, especially, they used in many different buildings. As the Greeks had already solved the principal problems of the Orders, the Romans, in working out their local and individual types, concerned themselves more in varying the details and mouldings to suit their own ideas.

The precedents offered by the Roman work to which we can refer, vary in detail and proportion in a much less degree than was true of the Greek Orders. This is because of the fact that the earlier buildings were almost entirely destroyed, or that, having accepted the Greek Orders as a basis, the Romans cared to make few experiments except in working out more elaborately the details of the various parts. It will also be noticed that the dates of execution of Roman work do not furnish the same standard for judging of its merit as was almost invariably applicable in the case of Greek architecture. Some Roman work of late date vies in execution with that of the best early periods in its proportions, massing, and composition of members and details.

There are comparatively few examples showing the Roman usage of the Doric and Ionic Orders, remaining in anywhere near a complete state of preservation, in Rome itself; while of the buildings in which the Corinthian and Composite Orders were used, there are many fine remains. Whether it was that the Romans actually but seldom used these forms, or whether, in the constant demolition of earlier work by each succeeding Roman ruler, these buildings were effectually destroyed, it is now rather difficult to say. However, the many capitals of early Ionic design used in later buildings, show by their varying character of workmanship and material that the latter alternative may have been the actual case.

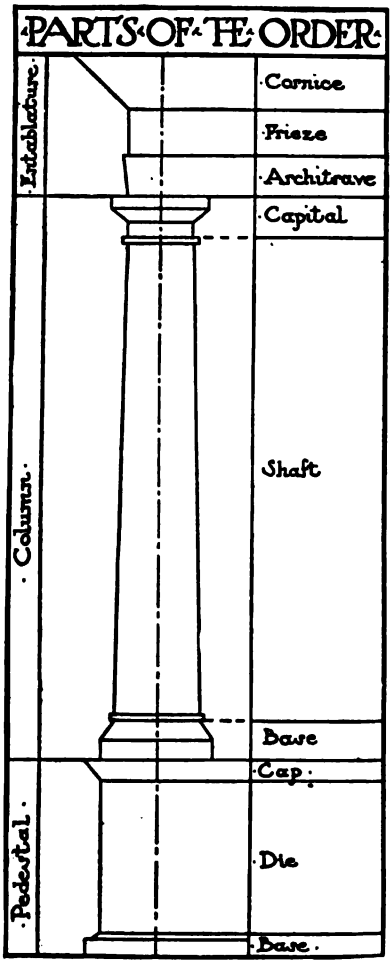


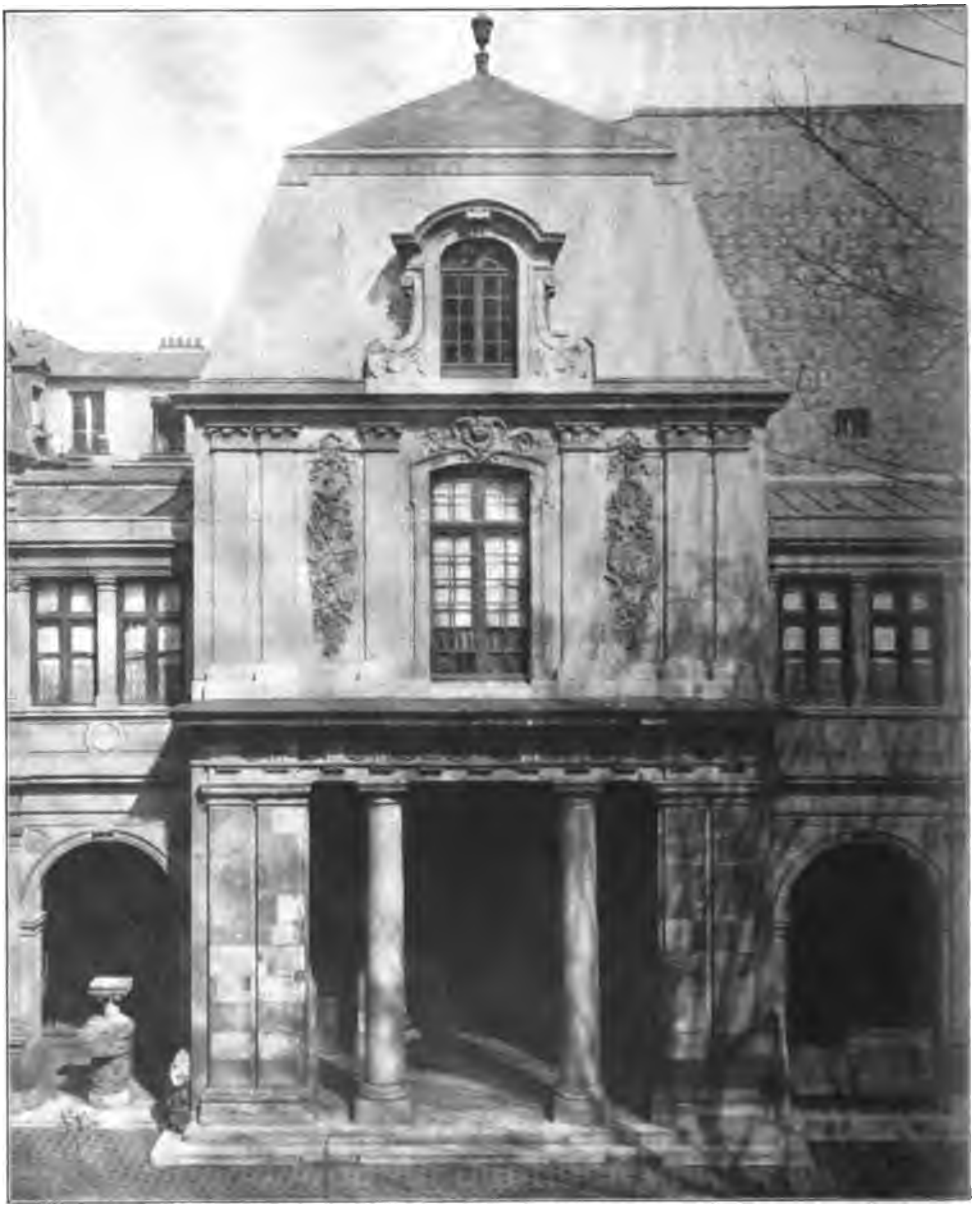
Fig. 105.

THE ROMAN ORDERS

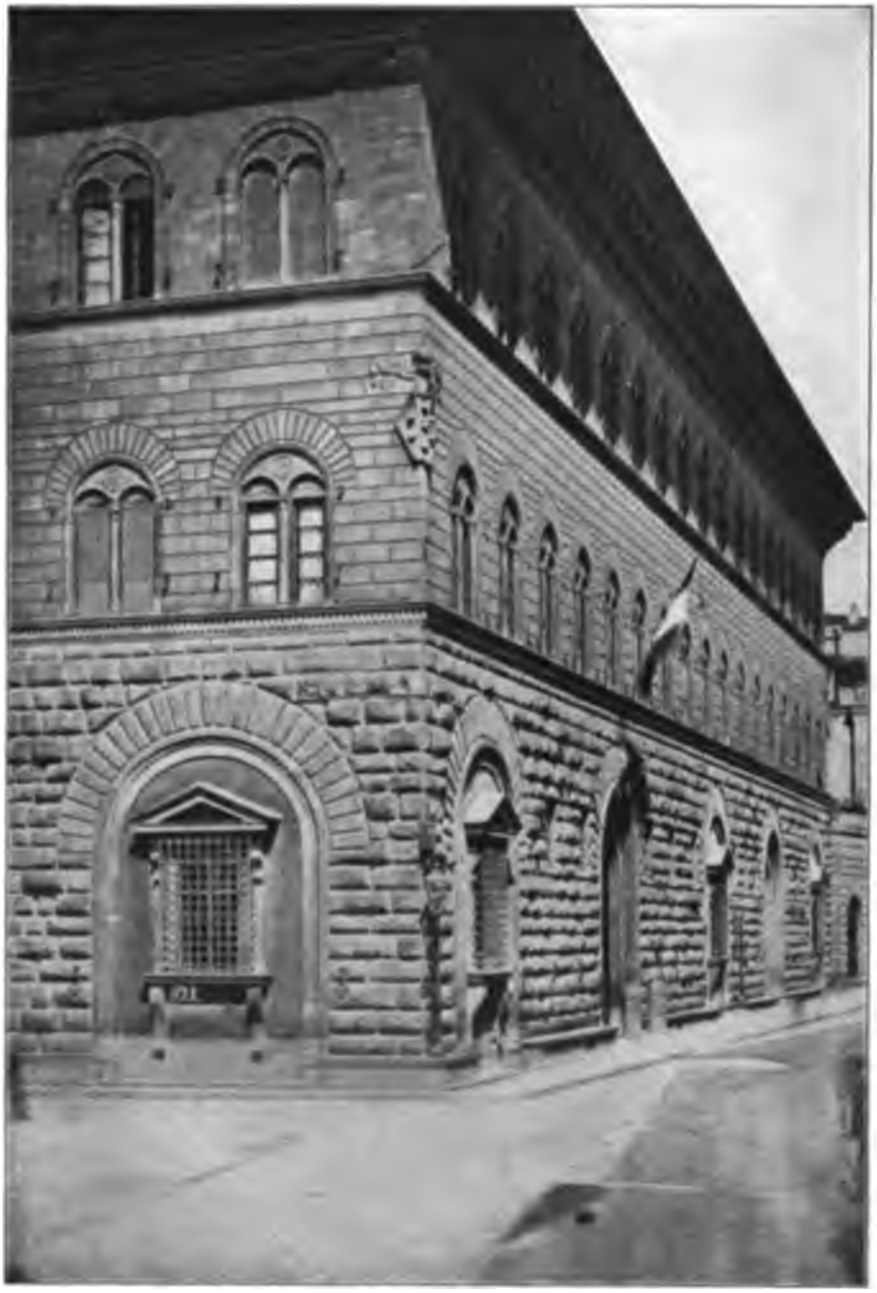
The Roman Order is properly composed of three parts—the *Column*, the *Entablature*, and the *Pedestal*, as shown in Fig. 105. The pedestal is often omitted in modern work; and the term *Order*, as has already been stated, may be applied as well to the column and entablature when used together, as to the complete Order.

Each of the three main divisions of the Order is also divided into three parts. The central portion of the column is known as the *shaft*; the lower portion is called the *base*; and the upper portion, the *capital* or *cap*.

The entablature, which is that portion of the Order occurring over the column, is composed of the *architrave* or *plate-band*, which rests upon the column and which is itself divided into several bands or *fascias;* the *frieze* or plain portion, just above, sometimes decorated with sculpture; and



PAVILION IN COURTYARD OF THE MUSEE CARNAVALET, PARIS, FRANCE
Finished in Seventeenth Century.



THE PALAZZO MEDICI (RICCARDI), FLORENCE, ITALY

Michelozzo Michelozzi, Architect.

The Private Palace of the Fifteenth Century. Note the Different Kinds of Masonry in the Different Stories. The Column is Used Only for Decorative Purposes in the Window Mullions of the Upper Stories.

the *cornice* or projecting part, formed of two main divisions—the *bed-mould* and the *cymatium* or *cap*, the latter the crowning member intended to throw off the rain-water and partially protect the sides of the building from the weather.

The pedestal is composed, like the other main divisions, of three parts—the central plain portion known as the *die* or *dado*; the lower projecting part, called the *base*; and the upper projecting part, called the *cap* or *cymatium*. Most of these main parts are again subdivided into many others called *mouldings* or *members*, which are further described in detail in each of the plates.

The Tuscan Order. There are five Roman Orders, one of which —known as the *Tuscan* (Fig. 6, Part I)—should be placed before the Doric, and is of much less importance than any of the others, although it was occasionally used in the lower or basement story of a building. This Order may possibly have been a combination of the Greek Doric with some characteristics taken from the Etruscan Orders, although, as it is now composed, it is probably most largely a creation of the Renaissance, founded upon some of the cruder remains and simpler experiments by the Romans in the use of the Doric Order.

This Tuscan Order may be largely disregarded in the present treatise, as its possibilities for use in modern work are very limited. It has seldom been used since Roman times, although a few good examples are found among the works of the Italian and the English Renaissance. It may be mentioned that its one invariable characteristic is in regard to the shaft of the column itself, which is always plain and never fluted. In fact, simplicity is the chief intention of the Tuscan Order. The mouldings are themselves so few, so simple, and so large in size that the effect is even almost inclined to be one of crudity rather than simplicity.

The Composite Order. The Romans also invented an Order termed the *Composite*, drawn out more in detail in Plates LV and LVI, in which an interesting method of proportioning the various parts of this Order is shown. Just as the Tuscan column may be considered as merely a simplified form of the Doric, so the Composite Order is a more elaborate form of the Corinthian, and was used only for purposes of extreme display and ornamentation. The general proportions of this Order are almost exactly the same as those of the Corinthian; and its minor details, while similar, are even more elaborately ornamented. The capital is an evident combination of the principal Ionic and Corinthian features, and the entablature is most richly moulded and carved.

These various Orders each resulted from the caprice of the all-conquering Romans, whose desire was that Rome should make an apparent advance over the civilizations which she had absorbed.

Vignola. Inasmuch as it is from the Roman use of the Orders that we inherit—through the medium, principally, of Vignola—our present Classical forms, it will be interesting to consider for one moment the reliability of this authority, in order to determine how much dependence we should place upon his versions.

The generally accepted standards in Classical Roman work are the Orders as given by Vignola. His study of Classical architecture was made about the middle of the sixteenth century from careful measurements of then-existing Roman work; and since that time "The Orders of Architecture, according to Giacomo Barozzio da Vignola," in both Europe and America, has been accepted as the standard authority. The first edition of this book was published in Rome in 1563, and was followed by other similar publications arranged by such men as Palladio, Scamozzi, Alberti, Normand, James Gibbs, Sir William Chambers, and others. Each of these authorities, while founding his version of the Orders upon that of Vignola, has also made some modifications in type and detail, adapting the Orders, in part unconsciously, to the custom and habit of his time, as well as incorporating changes which his own experience and practice had suggested. It is therefore rather to be expected that the various type forms advocated by these masters and used by them in their own practice are in reality *Renaissance* Orders rather than *Roman* ones; but, inasmuch as they follow the Roman rather than the Greek type, the former title is still broadly applicable to them, while the true Roman work may better be termed, for purposes of distinction, *Classic Roman* architecture.

Unit of Measurement of the Orders. Referring to Fig. 106, "The Parallel of the Orders," it will be possible to take up the consideration of the main divisions of the three principal Roman Orders. The unit of measurement is again subdivided into two modules or semi-diameters. The module is further divided, in the accompanying

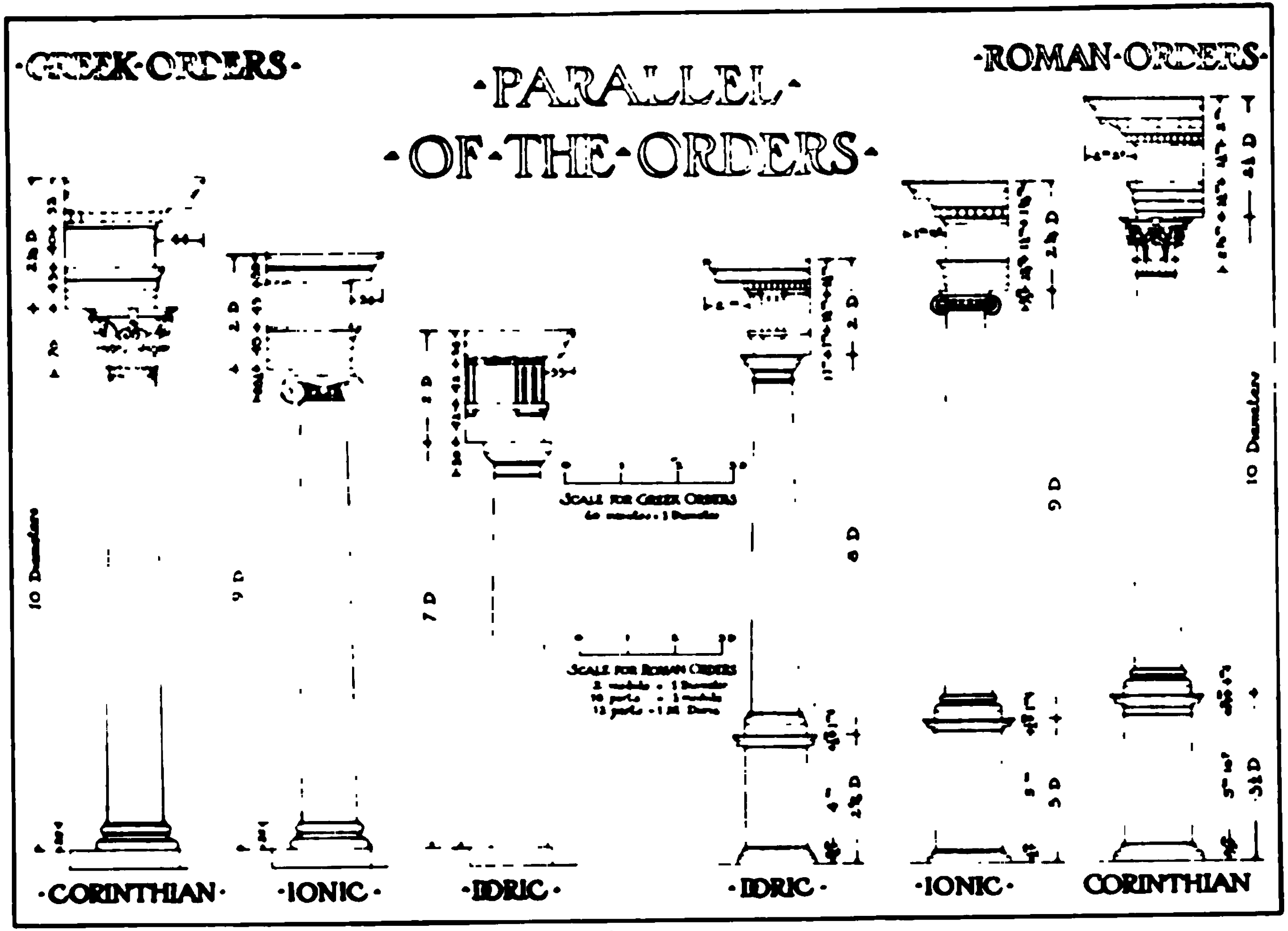

·GREEK·ORDERS·
·PARALLEL·
·OF·THE·ORDERS·
·ROMAN·ORDERS·
10 Diameters
9 D
7 D
8 D
9 D
10 Diameters
SCALE FOR GREEK ORDERS
SCALE FOR ROMAN ORDERS
·CORINTHIAN·
·IONIC·
·DORIC·
·DORIC·
·IONIC·
CORINTHIAN

Fig. 106.

illustrations and plates, sometimes into twelve parts, for the Tuscan and Doric Orders; into eighteen, for the Ionic, Corinthian, and Composite; and sometimes into thirty parts, as in the Greek work. The scales shown on the plates are interchangeable, and may be used with either system, five parts of the latter exactly equaling three parts of the Ionic and Corinthian eighteen divisions, or two parts of the twelve divisions of the Doric Order. The general proportion of the heights of the columns of these five Orders is:—in the Roman Tuscan Order, seven diameters; in the Doric Order, eight diameters; in the Ionic Order, nine diameters; in the Corinthian and Composite Orders, ten diameters. The height of the entablature is always one-fourth the height of the column; thus, in the Tuscan Order, it is one and three-fourths diameters; in the Doric, two diameters; in the Ionic, two and one-fourth diameters; and in the Corinthian and Composite, two and one-half diameters. This general statement of the proportions of the five Orders should be sufficient, at least so far as regards the first and last of the series; but the three principal Orders require more specific consideration.

At the right of the Roman Orders (Fig. 106), are shown dimension lines marked for proportionate divisions in height, these divisions being determined according to the unit of measurement indicated; the letter D standing for diameter and M for the module, or one-half diameter. These three columns are all of the same size and dimension at the base, so the unit of measurement throughout is of the same length.

The Pedestal. The Roman Orders are all shown with a pedestal, which is never employed with any of the Greek columns. These pedestals, in the examples shown, give the effect of being rather slender for their height. This is caused, in part, by the base being so narrow, and the die or central plain portion, as it is here drawn out, too high. Many authorities place the crown moulding of the base much higher on the die than the one here followed, and utilize a plain plinth below the base-mould to take up the extra height.

General Proportions of the Orders. The Roman Doric Order (Fig. 106), it is evident at the first glance, is radically different from its Greek prototype. This appears in the mouldings of the cap, in the base, in the proportions of the entablature, and its triglyph arrangement and treatment. This example, taken from Vignola, is supposed to have been somewhat closely adapted by him from the Doric Order used in the Theater of Marcellus at Rome; although he embodied some considerable changes from the original in this attempt at determining a satisfactory type form. The height of the column capital, including the necking, is one module or one-half diameter. The column base is the same height. The height of the entablature is two diameters; the architrave being one module, the frieze being one and one-half, and the cornice one and one-half modules in height and two modules in projection. The pedestal is two and four-sixths diameters high; with a base of five-sixths module, a cap of one-half module, and a die of four modules in height.

The Roman Ionic Order, with a column nine diameters or eighteen modules in height, has a pedestal three diameters high; of which five modules are reserved for the die, one-half module being for the cap and base respectively. In the column the base is one module in height; while the capital, from the necking up, is two-thirds of a module high, and from the bottom edge of the volute to the top of the abacus it is one module. The entablature is two and one-fourth diameters over all, which height is divided among the separate parts as follows:—the architrave has one and one-fourth modules; the frieze, one and three-fourths modules; and the cornice is two modules high and projects one module and thirteen parts.

The Corinthian column in Fig. 106 is ten diameters high. The pedestal is three and one-half diameters in height, with five modules and ten parts as the height of the die, two-thirds of a module for the base, and seven-ninths of a module for the cap. The base of the column is again one module in height. The capital is two and one-third modules high. As will be seen, the extra diameter in the height of the column is practically taken care of in the bell of the capital. The entablature is two and one-half diameters high, bearing the same relations to the column as in the two other Orders; and of this height, one and one-half modules are given to the architrave, one and one-half modules to the frieze, and two modules to the cornice, which in turn projects two modules and two parts.

EARLY ROMAN DORIC

All varieties of Roman columns, other than those distinctly marked by the design of their capitals as Ionic, Corinthian, or Composite, are termed *Tuscan* (*Etruscan*), unless it is known that the frieze is decorated with triglyphs, which in Roman work thus again become the distinguishing feature of the Doric Order.

There are but three instances of the use of the Doric Order in Rome itself, although it was often employed in Pompeii, Asia Minor, Syria, and Northern Africa; and the few other Italian examples are almost invariably circumscribed by individual peculiarities in each particular case, and are probably the product of Greek workmen and closely copied from Greek Doric forms.

Difference between the Greek and Roman Doric Orders. All the Roman orders differ in the relation of the column heights to their diameters, but a certain amount of resemblance is traceable to the earlier Greek form in both the Ionic and the Corinthian. This is perhaps least true of the typical Roman Doric, taking the form given by Vignola as typical, as this Roman Doric column is less like the Greek form than either of the other Orders.

The Doric column of the Romans is eight diameters in height as compared to the seven diameters of the Greek Order, and is one-seventh of its base diameter less at the neck; and it therefore differs, by the height of an entire diameter more than the other Roman Orders, from the general proportions of the Greek originals.

Aside from differences of proportion in the column shaft itself, and the different method of fluting the late Roman column, there is a very radical difference in the treatment of the entablature; while Vignola has given in the pedestal an addition which first appears in the architecture of the Romans. There is very reasonable doubt whether any true Roman precedent can be found to sanction the use of this innovation with any Order, least of all with the Doric column. In the Temple at Cora, which must be considered as of Greek workmanship even though occurring under the Roman *régime*, the apparent pedestal shown in Fig. 107 is really a large buttress confining the step approach to the Temple. This cut also illustrates the close relationship that exists between the early Roman work and its Greek originals.

The Roman Doric Order, as used in the first examples, varied but little from the preceding Greek types. The column generally has no base, while the echinus and the fluting of the column closely follow the Greek sections.

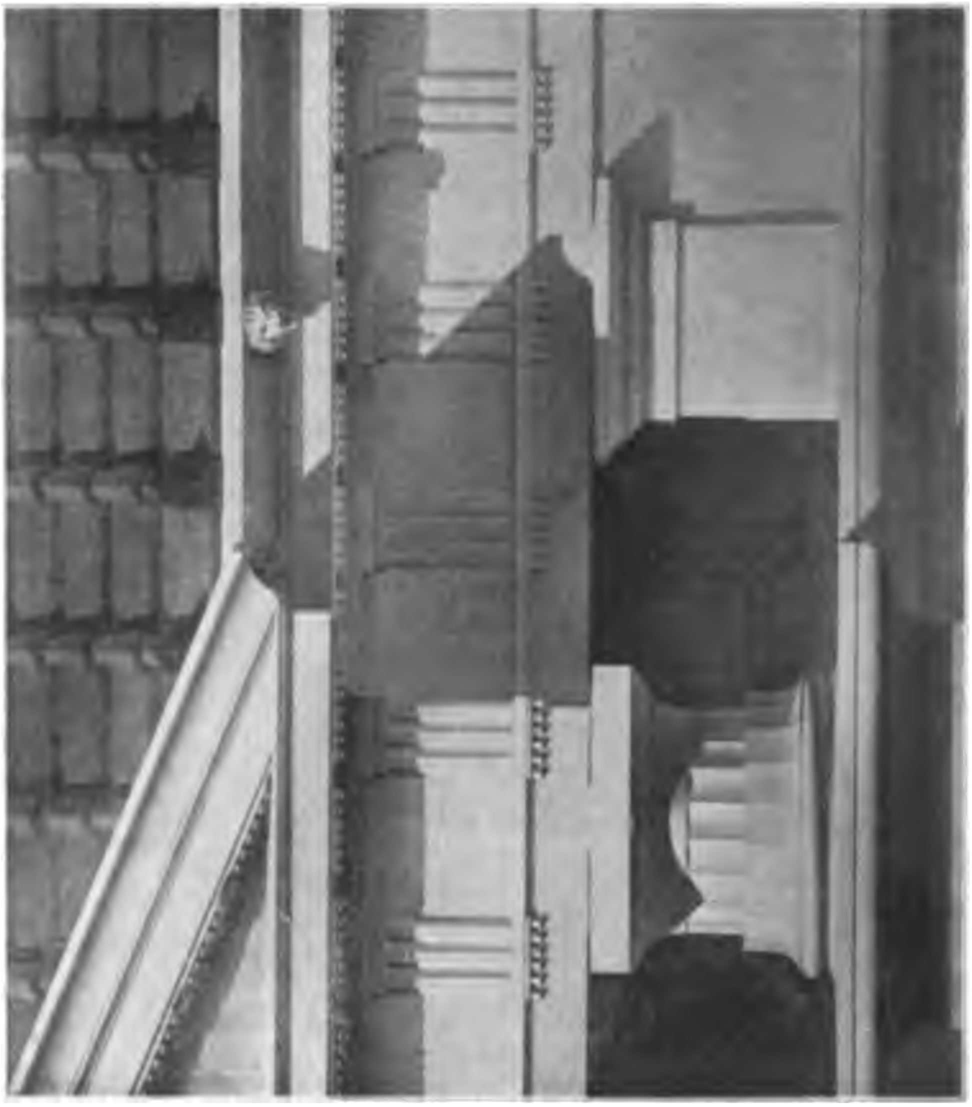


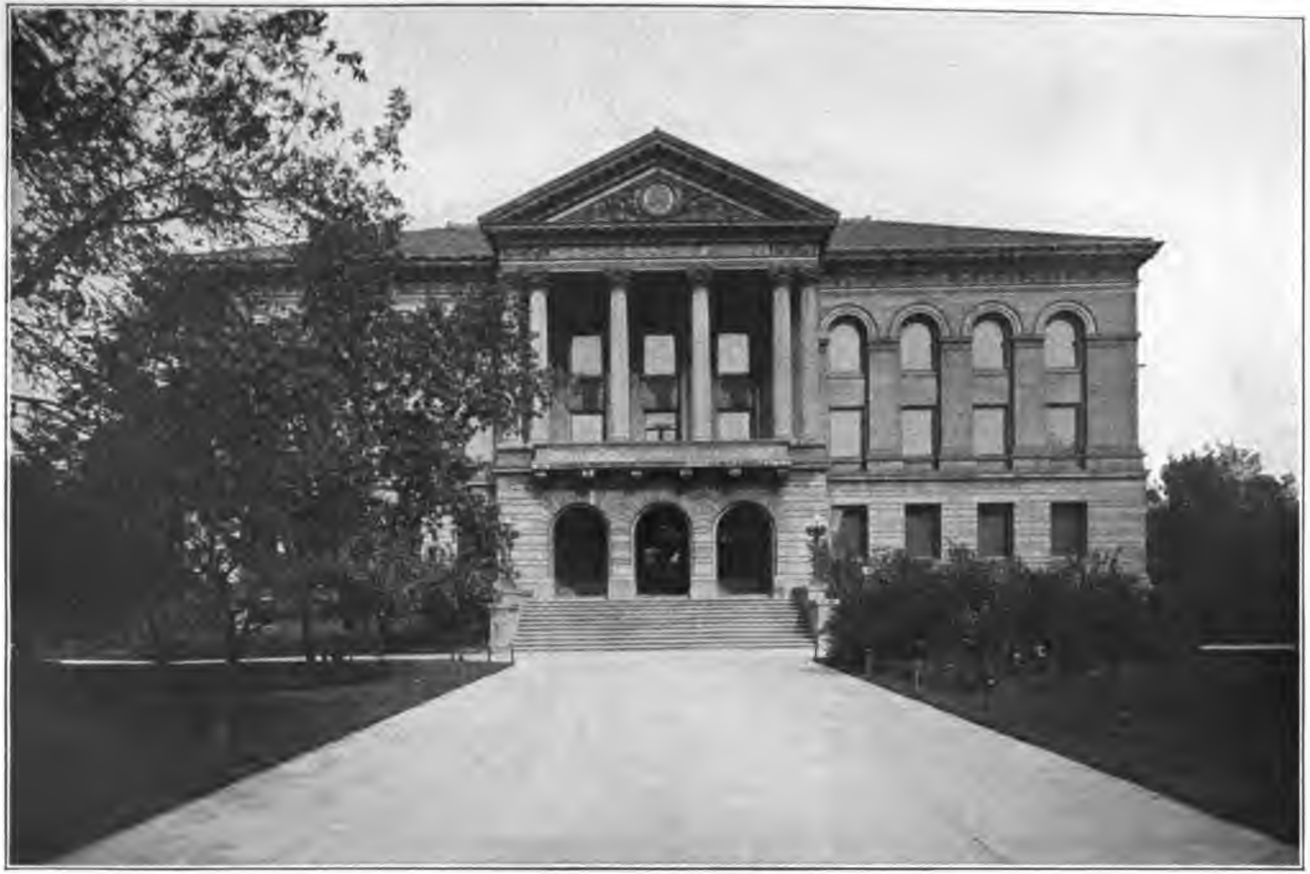
Fig. 107 Detail of Greek Doric Order.
From Temple of Hercules at Cori.

Temple at Cora, Italy. The only extant example of a rectangular Roman Doric temple is the one at Cora, the exact date of which is not known; but from probably contemporaneous remains, it has been thought that it is at least as early as 80 B. C. In the remains of this temple (Fig. 107), the column, although given a base, otherwise very closely resembles the Greek Doric Order; and the triglyph is placed on the corner angle of the building after the Greek custom.

Fig. 107 is a reproduction of one of the famous Brune drawings now owned by the Massachusetts Institute of Technology. The temple is square in plan, has a four-column or hexastyle portico, and in the main differs but little from preceding Greek work. The cornice includes a mutule over the metope, and a triglyph used on each face of the corner angles; and many of the moulding sections, as well as the fluting of the columns, are distinctively Greek. On the other hand the triglyphs are of different proportions, and the column has a base; while other of the mouldings—such, for instance, as those on the antæ or pilasters—indicate the effects of Roman influence. This drawing is so arranged that the cornice is shown complete, with a part of the tile roof; and the column is cut so that the necking and the base, with the crowning mouldings of the stylobate or pedestal are both plainly displayed; while a plan of the underside or soffit of the cornice is shown at the right of the column. This pedestal is in reality only a projecting buttress, enclosing the space of the step approach, its top being level with the floor of the platform or stylobate. These early buildings were probably all executed by Greek workmen, which explains their close adherence to the Greek forms.

Use of Triglyph at Corner Angle. In all the early examples of the use of the Roman Doric Order employed in buildings square or rectangular in plan, the triglyph is used on the corner of the angle after the Greek fashion, as is further shown in the drawings of fragments of the Roman remains at Cora, the modern Cori. (Figs. 107 and 109).

The Temple at Cora, as well as some remains of Roman Doric temples dating from about 200 B. C. and possibly restored at a later period, indicates, by the narrow intercolumniation at the corner, as shown on the old floor plan, that the triglyphs occurred on the angle after the Greek fashion. On the tomb of Scipio (Fig. 108) and the two tombs at Norchia, as well as on the pedestals shown in Fig. 109, the triglyphs always occur on the angles. In the three uses of this



CHIÇAGO ACADEMY OF SCIENCES, LINCOLN PARK, CHICAGO, ILL.
Patton & Fisher, Architects, Chicago, Ill. Built in 1891.

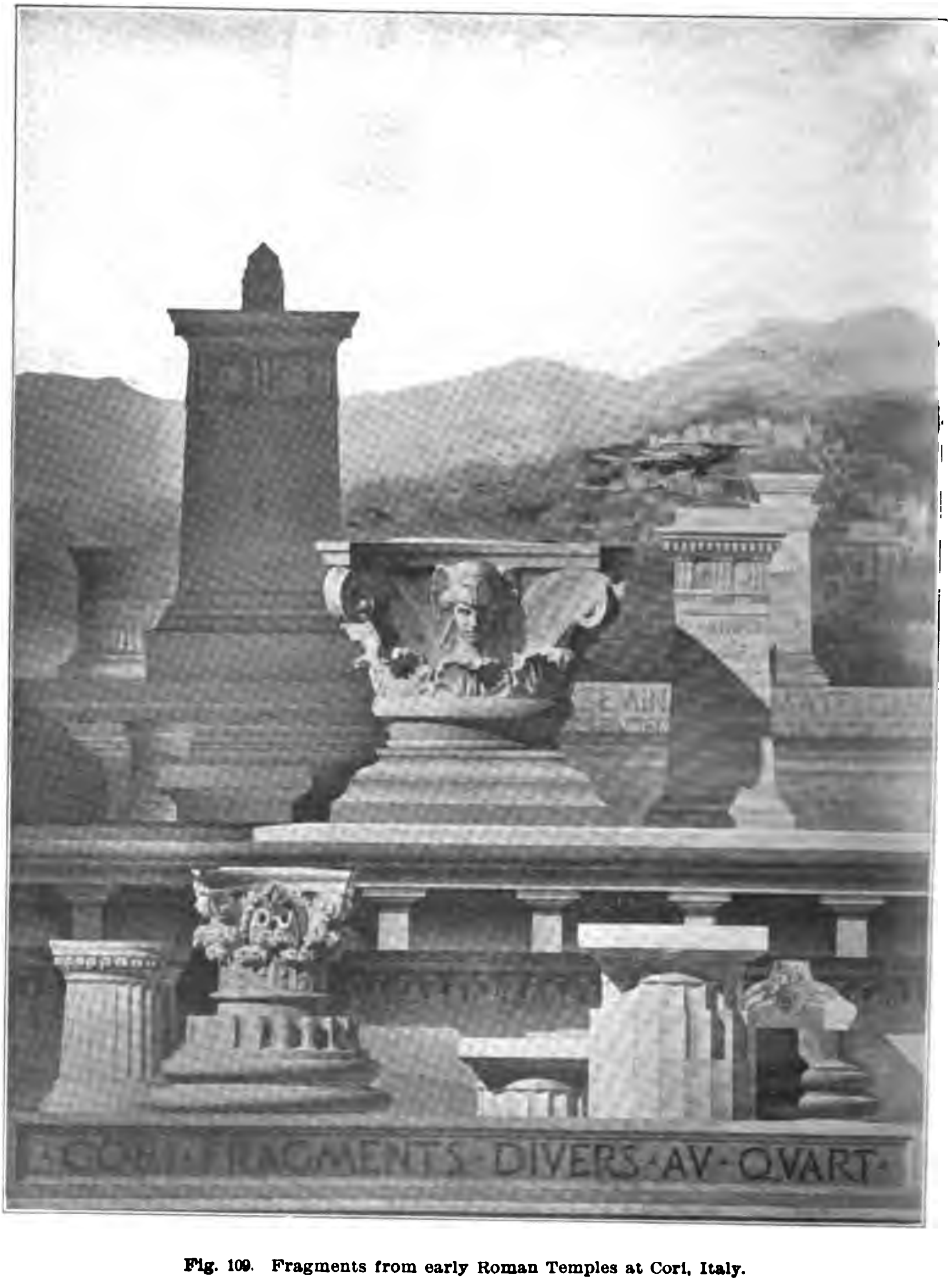


Fig. 109. Fragments from early Roman Temples at Cori, Italy.

Beyond these is another portion of a column base, probably used with a Corinthian or Ionic column, here carrying a small fragment with mask decoration.

The two moulded bases described above show evident experiments on the part of their designers in the use of this form of base. In the one last mentioned, two torus mouldings are separated only by a fillet; while in the one first mentioned, there is a very narrow and apparently much crushed hollow member between the fillets separating the torus mouldings.

These fragments are all placed in front of a cornice with beautifully carved egg-and-dart and bead-and-reel mouldings, supporting rather awkwardly-proportioned brackets carrying the crowning members of the cornice. Above this cornice, in the center of the drawing, is a base supporting a capital of rather unusual design. In the center of each side, occupying the space between the volutes, is a severely classic head of Minerva. The corners are supported by simple but strong and heavy volutes. The abacus is similar to that on the early Corinthian capitals. At the right and left of this capital are pedestals carrying Doric cornices not unlike in treatment to the cornice of the Tomb of Scipio. In the background are several pieces of architectural fragments. Another round pedestal is here placed at the left of the plate; while the tall square pedestal carries a small *antefix* decorated with a Greek *anthemion* motif. At the right is a panel of lettering, and above this an ornamental cresting of a honeysuckle motif, which shows in the reproduction almost as dark as the Classic landscape in the distance.

The beautiful lettering in this panel, and also on the face of the square pedestal immediately in front of it, should be noticed. All the details shown on this plate are thoroughly Greek in both treatment and feeling, and were undoubtedly executed by Greek workmen and architects, at an early period in the development of Roman architecture.

CLASSIC ROMAN DORIC

It seems, therefore, that in Roman buildings the earlier usage followed very closely the Greek models in the position of the triglyph, and in the sections of the mouldings themselves; but the real Roman Doric Order is that shown in their later work. By the time of the building of the Theater of Marcellus (B. C. 33–13), the Order had taken on a distinctly Roman character, both in the treatment of the mouldings and in its general proportions. By referring to Fig. 110,

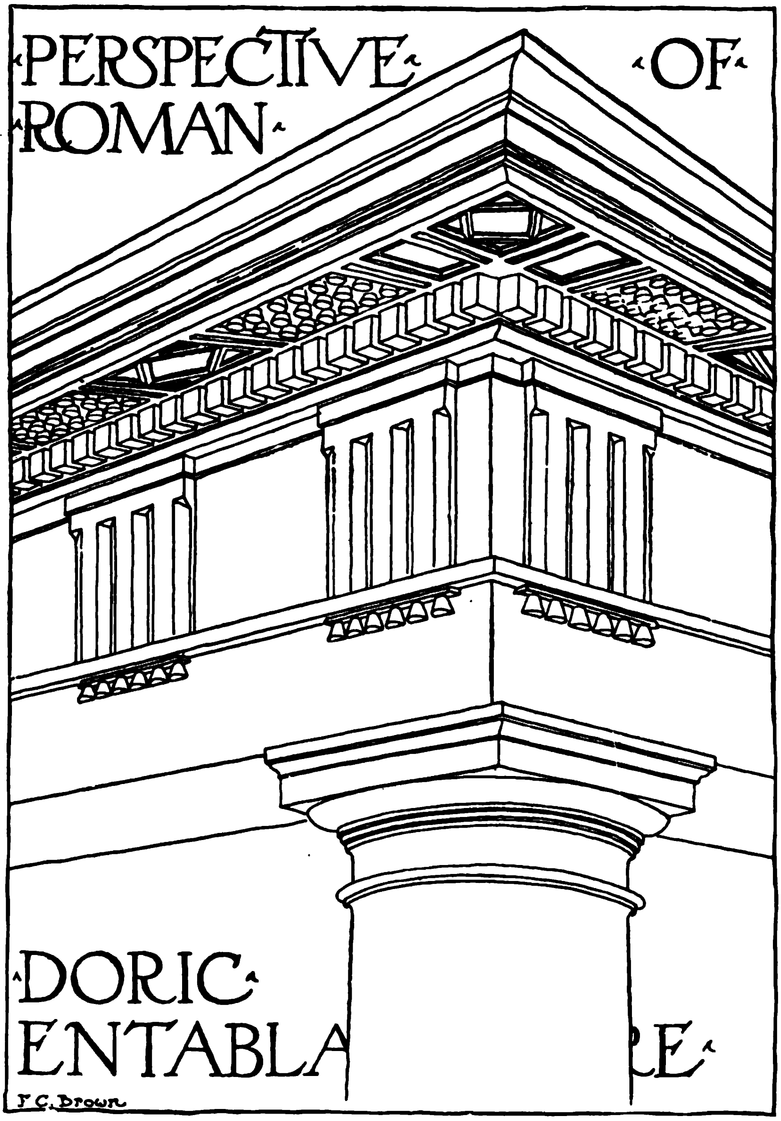


Fig. 110.

it will be seen how different the employment of this Order was from the Greek Doric. The use of the dentil and treatment of the soffit are quite distinctive, and even when the Greek form of mutule is used, it is with essential differences of detail. This example is generally shown without a base to the column; in later Roman usage, however, it is quite safe to include a simple base as an essential part of the Doric Order. This may have been due to the influence of the Etruscans, who usually employed a simple base on their crude columns. In Fig. 111 are shown four examples of Roman Doric bases. Two of these (B and D) are from Vignola, one (C) from Palladio, and one (A) from an old example at Albani near Rome. The base at Cora, Fig. 107, very closely resembles that shown at B in this figure, with the small half-round below the fillet omitted. This base (B) is that used by Vignola in his *denticular* Order, while he assigns the section at D to the *mutular* form.

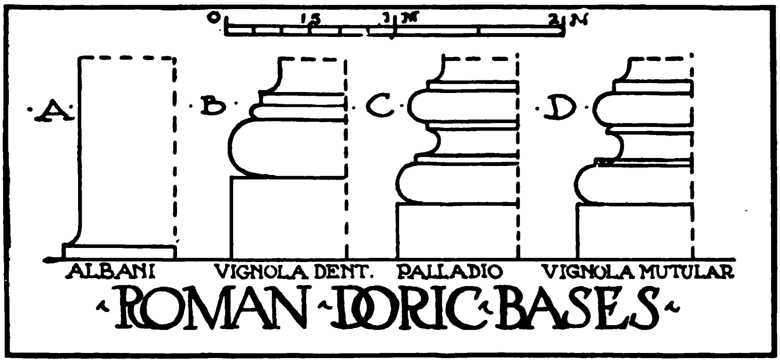


Fig. 111.

Use of Column in Connection with Arcade—The Tabularium. The Tabularium at Rome, built by Catullus in 78 B. C., carries the earliest known use of the Doric column employed to separate the arches of an arcade, after the manner shown in Fig. 99. This structure was built against the Capitoline Hill, and presented a face of immense wall, carrying, thirty-six feet above the ground, a series of arches facing toward the Forum and supported on piers.

The next examples, in chronological sequence, are those in the Theater of Marcellus, 23 B. C. (Fig. 113), and in the Colosseum, 72 A. D. (Fig. 112). In both these cases, the columns are engaged and set upon a continuous course or footing, which may be considered as suggesting the individual column pedestal shown by Vignola. The

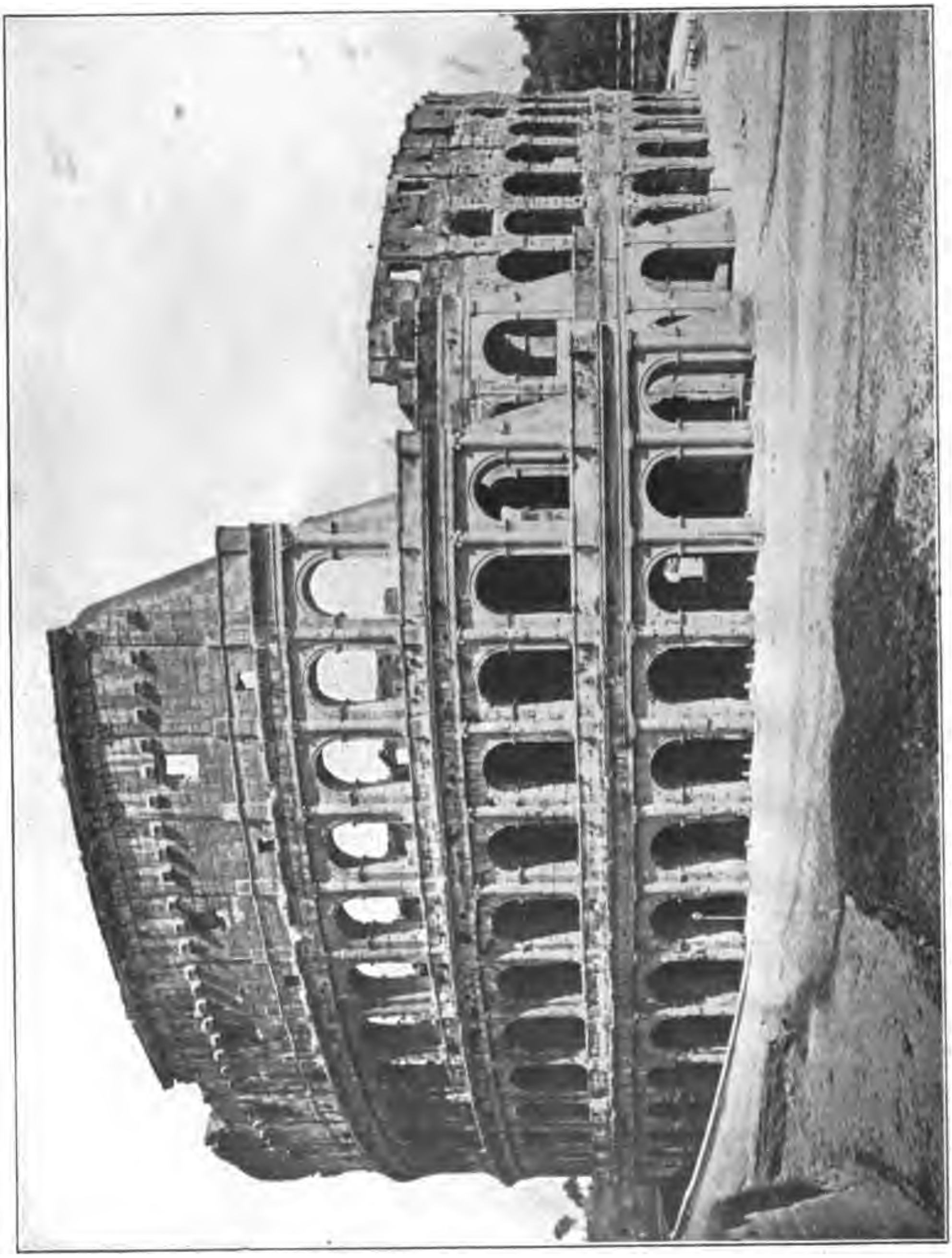
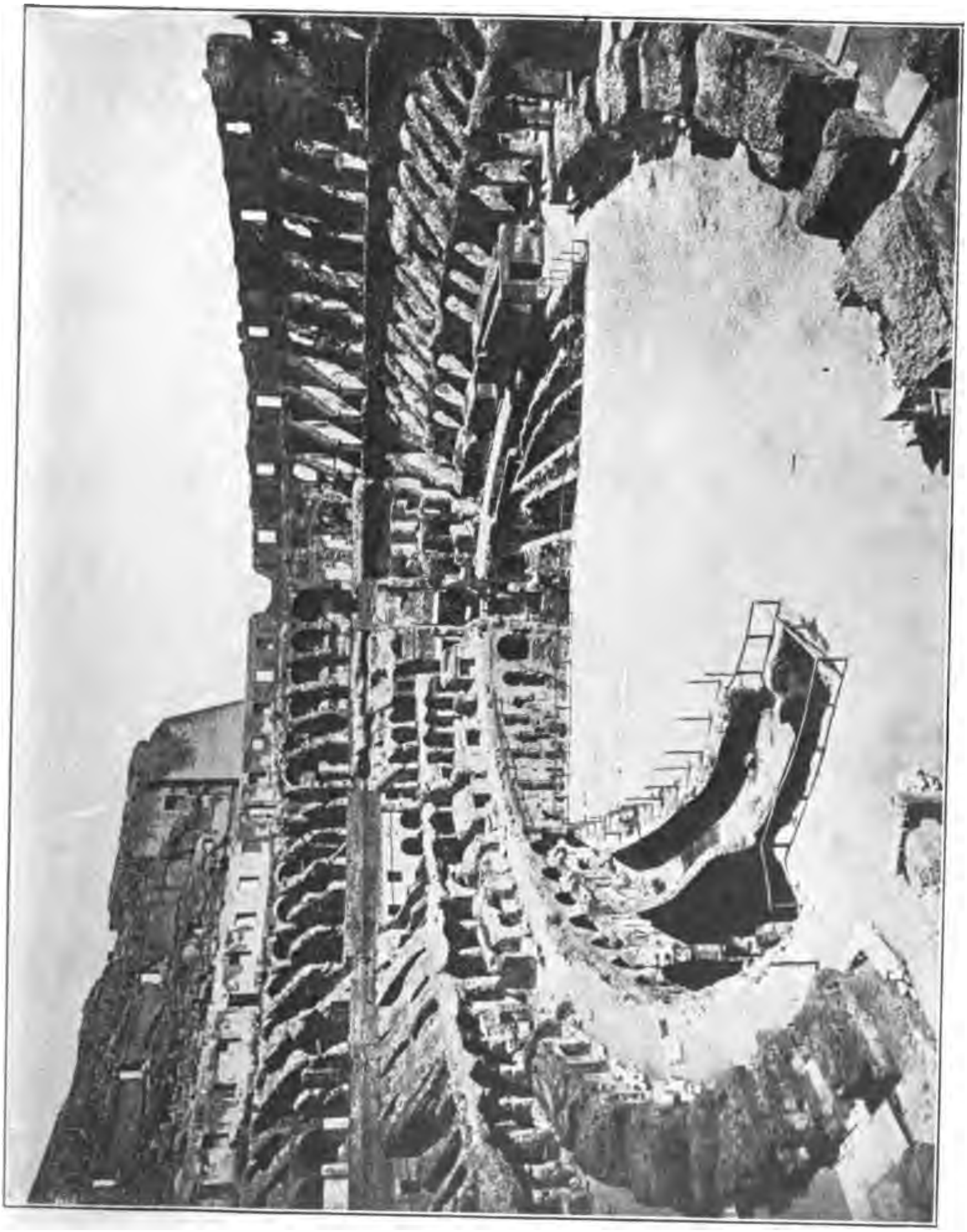


Fig. 112. Exterior of Colosseum.



Interior of Colosseum, Rome.

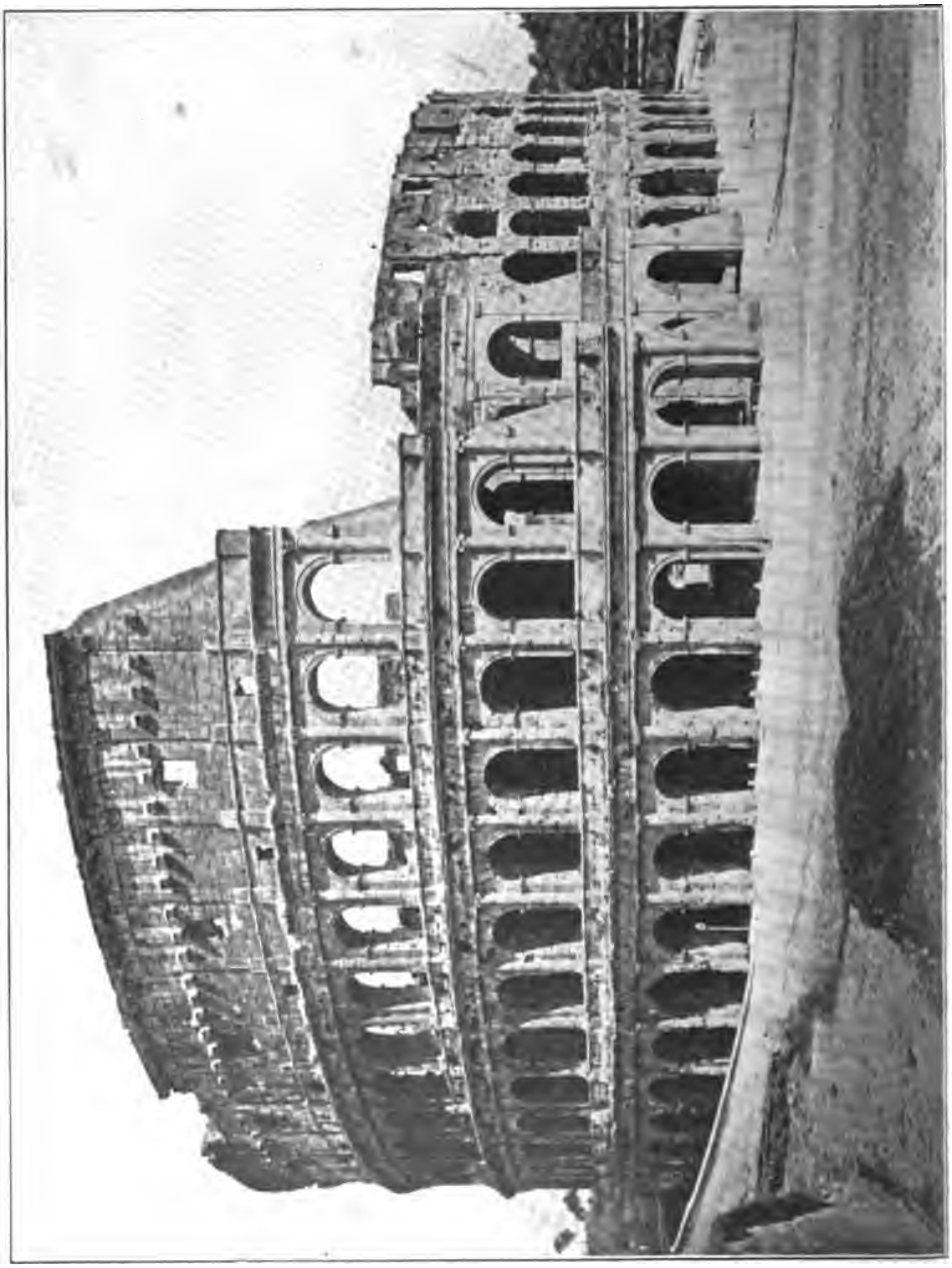
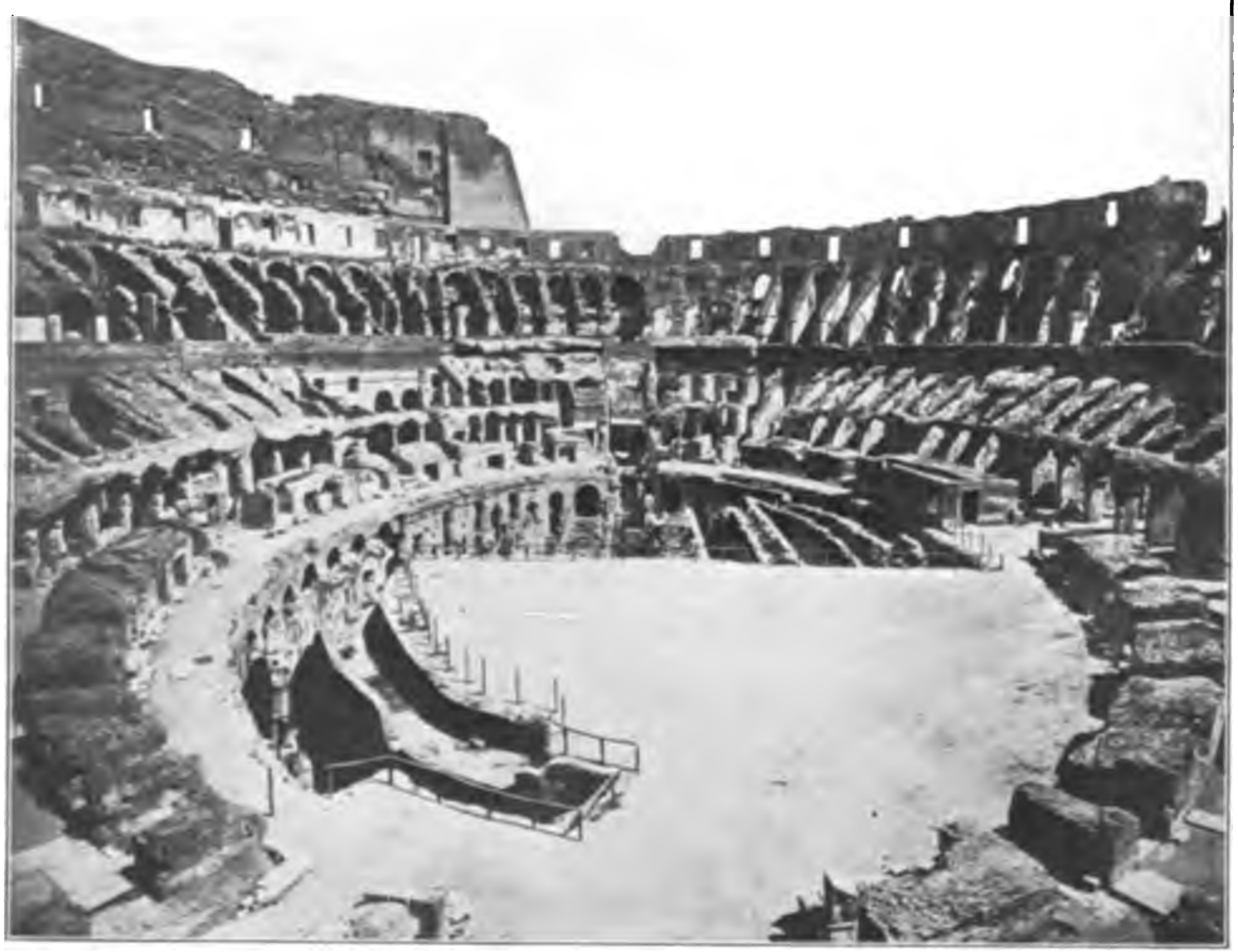


FIG. 118. Exterior of Colosseum



Interior of Colosseum, Rome.

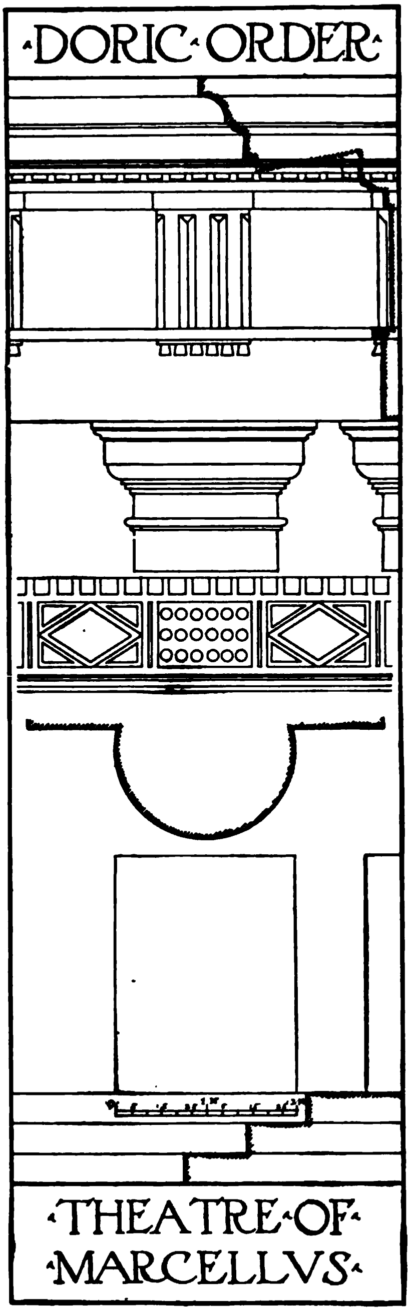
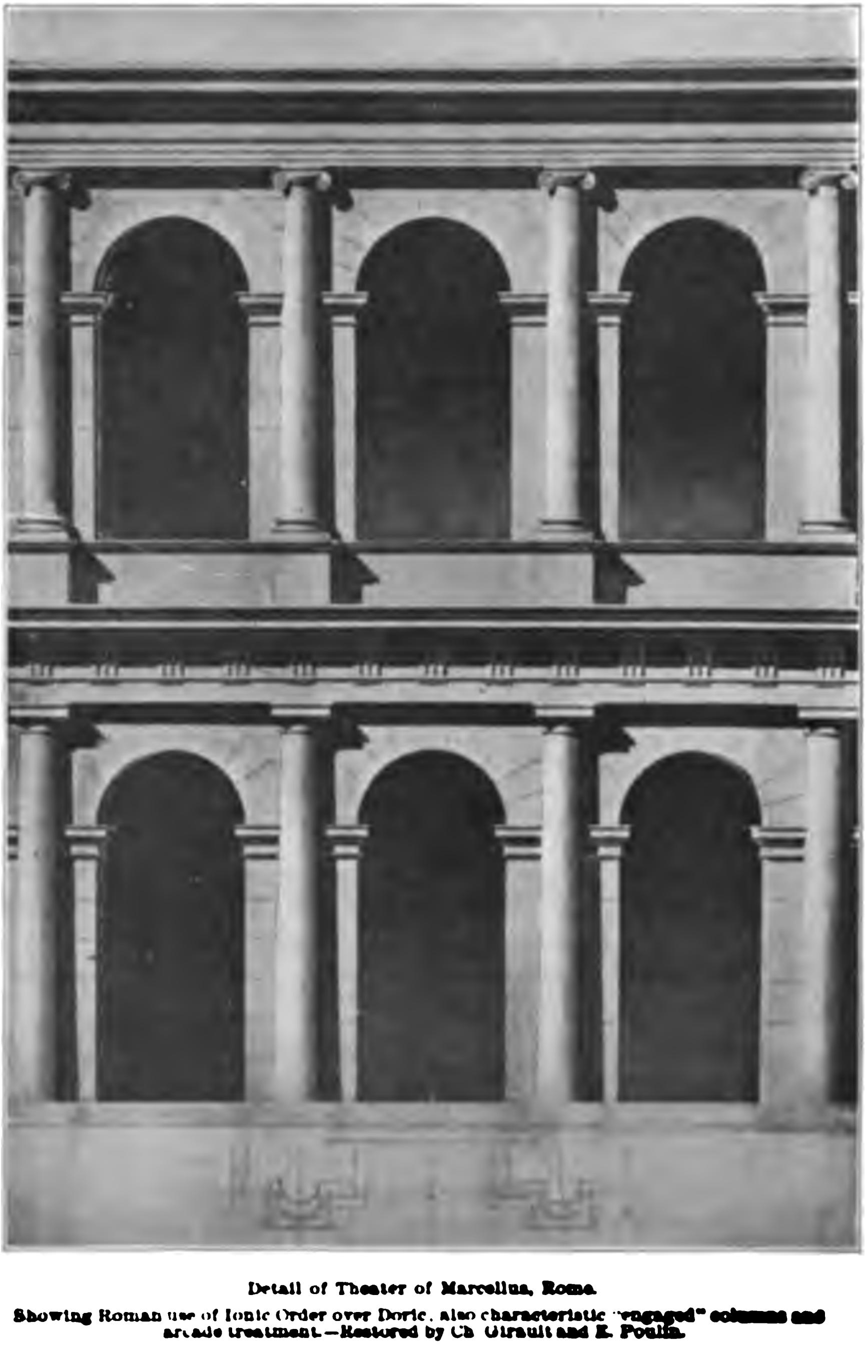


Fig. 113.

mouldings of the Theater of Marcellus and the Tabularium are suggestively Greek in character, while in the Colosseum the moulding sections are almost thoroughly Roman in outline and the Orders are all of a more ordinary type. All three of these buildings are in Rome, and the two last are also the two best known examples of the use of the Roman Doric Order.

The Colosseum. The Colosseum is undoubtedly the best known amphitheater, and, while commenced in 72 A. D. by Vespasian, was continued by Titus, and finally inaugurated by Domitian in 82 A. D. At this time the three lower stories only were completed. These stories are each decorated on the face by an attached Order, the lowest being Tuscan (there are no triglyphs in the frieze), with mouldings following more the Etruscan than the Greek section. The second story is decorated with an Ionic Order, and the third with a Corinthian, set on a dado breaking out to form a sort of pedestal underneath each column shaft. The entablatures are all carried around the building without any break. The top story, above the arcades, was not added until the early part of the third century A. D.



Detail of Theater of Marcellus, Rome.

Showing Roman use of Ionic Order over Doric, also characteristic "engaged" columns and arcade treatment.—Restored by Ch. Girault and E. Poulin.

Theater of Marcellus. In Fig. 113 is drawn out the Roman Doric Order from the Theater of Marcellus. This shaft is shown rising directly from a series of steps. Later discoveries seem to indicate that this shaft had a very simple base treatment. Fig. 110 is a perspective of a supposititious corner angle showing the use of a Roman Order, with details taken from the Theater of Marcellus. This example of a Doric Order—with the cornice falsely shown as though broken around an outer angle or corner of the building—is not typical, in that it omits entirely the mutule in the cornice. The mutule is as important a part of the general use of the Roman Doric Order as it was of the Greek, save that in the later Roman usage the mutule was never spaced over the metope, but the soffit of the cornice from mutule to mutule was filled by means of a decorated panel. This particular cornice carries a row of dentils in place of the mutules, while a panel in the soffit occurring over the triglyph is filled with dependent guttæ; and the Order shown here and in Plate VII, accompanying Part I, may be more appropriately termed *Denticular Doric*, an invention of the Romans. As a matter of fact, however, we have no authentic Roman example in which this corner treatment has been actually employed. Vignola, in placing his triglyph and metope over the center of the column and leaving the corner angle plain, as is shown in this perspective sketch, seems to have taken it for granted that the Romans, in *case* they employed the Order in this way, would so have treated the external angle of the frieze. But in the best late Roman instance of the use of this Order, the Theater of Marcellus—and that, too, the instance on which Vignola is supposed to have founded his version of the Order—there is no such corner angle treatment, the building itself being circular or elliptical in plan, and therefore requiring no angle treatment whatsoever.

The Pedestal of the Order. The possible derivation of the pedestal treatment is suggested in Fig. 125, where the Ionic Order of the Theater of Marcellus is drawn out. It is here seen that the pedestal and its cap form a continuous belt course, merely breaking out around the projecting column; but the actual effect in the building is more that of a continuous dado, upon which are set the column shafts. The reason for this is evident, as otherwise the projecting cornice of the lower Order, the Doric, would completely cut off the lower portion of the Ionic column shaft when seen from the ordinary ground level.

As a matter of fact, there is, in Roman usage, no instance of what may strictly speaking be termed a "pedestal" occurring with any Order; and such apparent instances may be traced to one of the two methods already mentioned as used on the Colosseum or on the Temple at Cora. In Syria there are a few examples of pedestals, as at Kanawat, Mousmieh, Palmyra, and the Propylæa at Baalbec; but in the temples, theaters, and amphitheaters of Rome they do not exist, except as parts of an attic or dado required to allow a space for the vaulting of the lower story, as in the Colosseum, or as a buttress used to bound the stepped approach to a temple, as in the Temple at Cora.

There is, moreover, no late and purely Roman form of the Doric Order used in a building where an angle treatment of the entablature

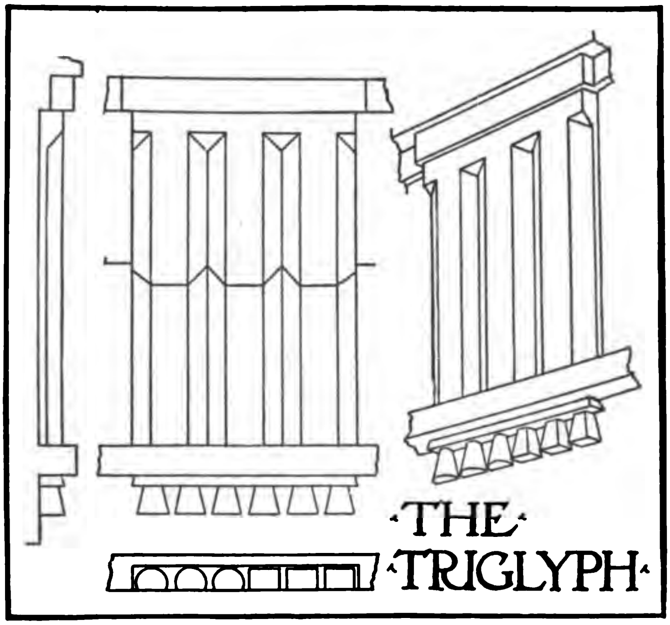


Fig. 114.

has been required. This liberty of Vignola's, as well as the similar one where he has bestowed a pedestal under the Roman column, is not considered to have adequate foundation in true Roman work, although it undoubtedly expresses the general custom or usage during the Renaissance period.

Vignola's Mutular Roman Doric. The mutular Roman Doric, according to Vignola, is shown in Plate IX, Part I. The entablature, as already stated, is one-quarter of the column height; and the capital—one module in height—occurs directly under the triglyph in the frieze, which is itself a module in breadth. This triglyph is shown more particularly in Fig. 114; and by referring to this illustration, its peculiarities may be more readily comprehended and understood. At the left is shown a view of the end or side of the triglyph; while, beside it, is the elevation of the front, with a section through the *channels* (canals) on its face. Below is shown a plan looking up at the guttæ hanging from it; while at the right is a perspective of the triglyph, which should be self-explanatory. It will be observed that half of the guttæ are shown circular in plan; and half, square or rectangular. The circular, conical shape is that more often used; but the square, pyramidal form occurs in many examples. The triglyph in Plate IX, Part I, is considered as always being placed over the columns and on the same axis, although this deduction rests on perhaps insufficient foundation, as we have already seen. Between the triglyphs is allowed one and one-half modules, or, in distance, a space equal to the height of the frieze. This is kept for the metope, which in old examples is always square, or apparently square. These spaces were sometimes ornamented by carvings of different objects, such as heads of animals, trophies of arms, etc.—a custom borrowed from the Greeks, and derived, as we know, from the placing of actual objects in the open space over the lintel beam.

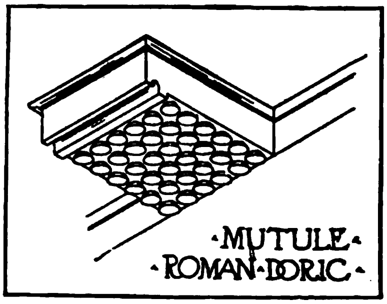


Fig. 115.

The Roman Doric Order shown in this plate is of very good general proportions, and such as would actually be used on the ground story of a building or in the lower part of a monumental design. The pedestal may be suppressed, as the ancients indeed seldom used it except when they carried the Order on an uninterrupted pedestal-base for the purpose of raising it above a projecting belt course. The shaft of this column is sometimes channeled with twenty channels, separated from each other by a sharp arris after the Greek fashion, and is as often left plain; while it is occasionally channeled as shown on the right side of the column in Plate IX, Part I, which treatment, for work of a distinctly modern character, is perhaps more appropriate. This

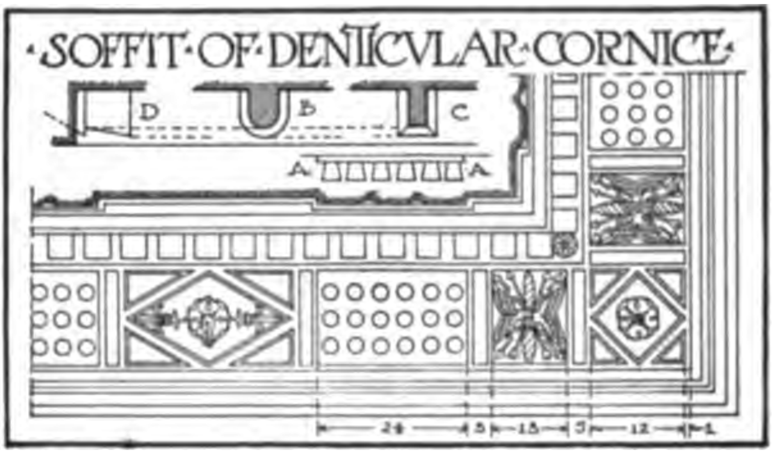


Fig. 116.

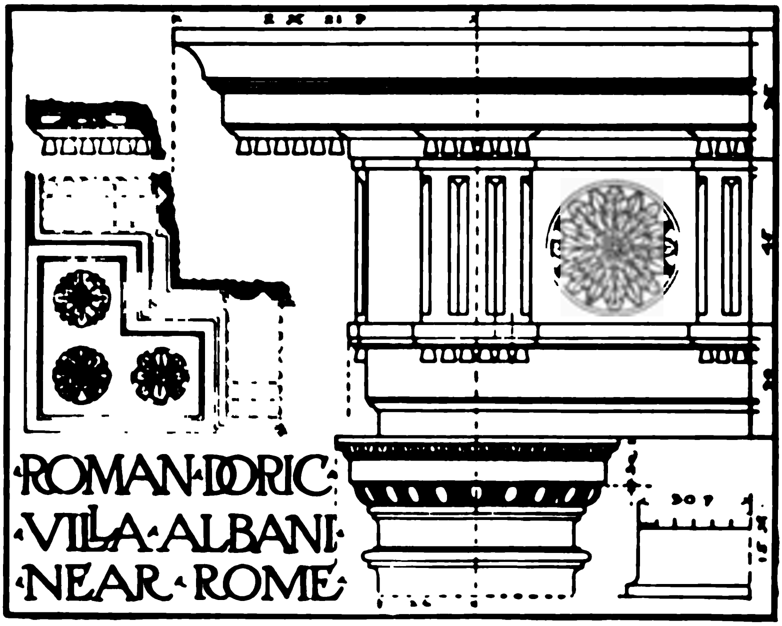


Fig. 117.

plate also shows the use of the Roman mutule, which is drawn out separately in perspective in Fig. 115. The relations of the mouldings to each other, and the proportions of the smaller parts or members of the design, are fully shown in this plate and in Plate VII, Part I. The latter plate also shows the plan of the column and an elevation of the pedestal, as well as two *impost* mouldings which are used to receive the arches resting on the piers between the columns, when employed after the Roman fashion shown in Fig. 99.

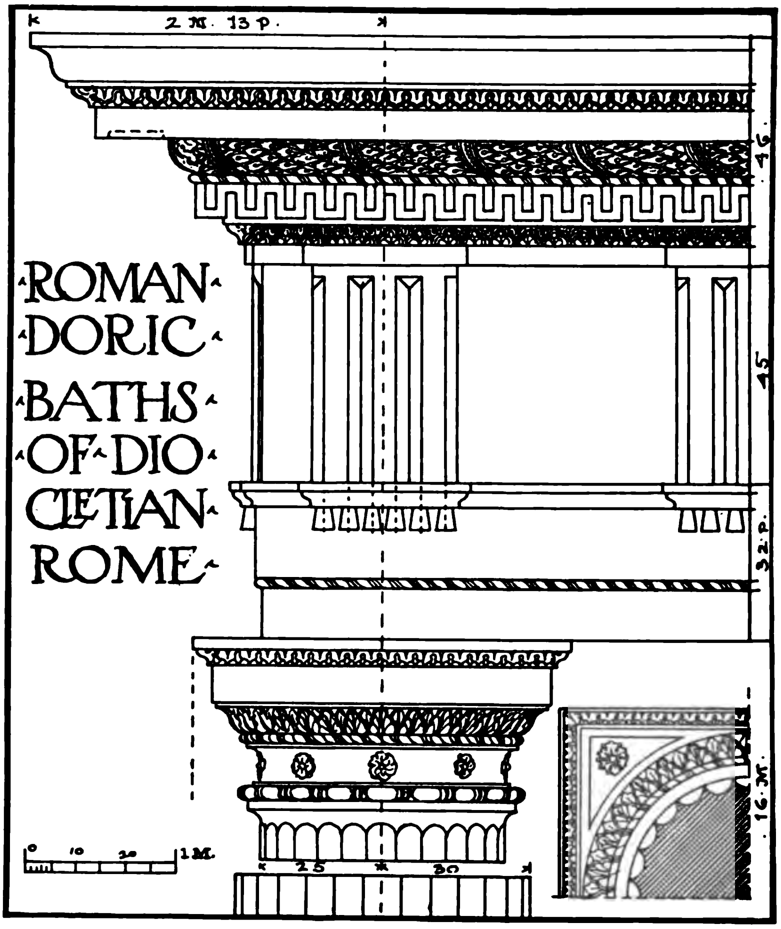


Fig. 118.

It should be noted that throughout this Order the abacus is square in plan, and is ornamented around its upper edge with a cyma reversa and fillet. From the bottom of the abacus, the column and mouldings are round or circular in plan down through the torus of the base. This torus rests upon a plinth square in plan and rectangular in section. The soffit of the cornice, shown in this plate, is drawn out in Fig. 116. In Plate VIII, Part I, is shown another Roman Doric Order, after Palladio, in which there are no mutules in the cornice and the dentils are also omitted. This plate should be compared with the two preceding plates in order to understand the great possible variation in the mouldings, sections, etc. It should be mentioned that a fault in the Order in Plate IX, Part I, is the slight projection of the triglyph, making necessary so flat a treatment of the half-channel occurring on its two edges that in practice it would be barely perceptible. This triglyph would much better have a section of as much projection as is shown in Fig. 114.

Other Forms of Doric. The Doric Order from the Villa at Albani near Rome, is shown in Fig. 117. It is an interesting but somewhat peculiar instance of the use of the Doric Order, especially in the treatment of the guttæ on the mutule soffit, as well as in the triglyph and architrave treatment below. The Roman Order from the Baths of Diocletian at Rome, shown in Fig. 118, is of rather a late date (about A. D. 290), as is further borne out by the character of the mouldings and their over-ornamentation—all quite typical of later Roman architecture.

Neither this example nor the one shown in Fig. 117 is to be advocated for exact reproduction in general work, although both of them contain many valuable suggestions for the treatment of various parts of the Roman Doric Order.

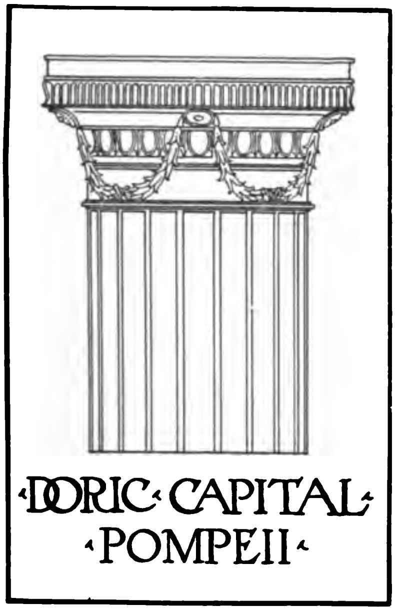


Fig. 119.

The capital from Pompeii, illustrated in Fig. 119, is an interesting variation on the Greek form, that is typical of much of the early Roman work. The column shafts of this period were all tall and slender in their proportions.

CLASSIC ROMAN IONIC

Development and Use of the Order. There are comparatively few remains of Roman buildings where the Ionic Order was originally used. Among the Romans this Order certainly never met with the favor accorded to it by the Greeks. At the same time, the great number of antique Ionic capitals used in the naves of Roman Basilicas of later date, indicate that at one time this Order must have been employed to a considerable extent—probably in the early Forums that were afterwards destroyed to make room for later buildings. The Roman columns, being generally monoliths of marble or other beautiful material, instead of being shafts composed of various small sections after the Greek fashion, were sufficiently valuable to be saved and used again in the newer work that was to take the place of that torn down. The capitals may have been used a second time with the columns to which they belonged, or they may have been transposed and used with other columns. As a consequence, in many Roman churches, frequently neither the column shafts nor the capitals exactly match in either color, material, design, or workmanship, often being obviously of different dates and taken from different buildings.

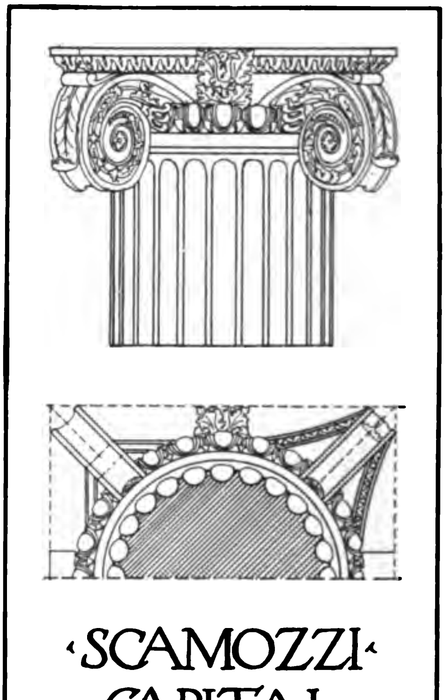


Fig. 120.

In the Roman colonies and in Syria, the Ionic Order seems to have been employed longer than in Rome itself, possibly because of the difficulty of carving the elaborate Corinthian capital which had later so much vogue. Examples of the Ionic capital carrying the canted volute on the angle, are very rare. At the large size in which this Order was employed by the Romans, the awkwardness of this angular treatment of the Ionic Capital undoubtedly became more apparent, and for this reason they may have avoided its use whenever it was possible. When, during the Renaissance, an Ionic capital with the angular volute treatment on the four corners came into general use, it was called the "Scamozzi" capital, after the architect who first most frequently employed it, for the purpose of distinguishing it from the more usual Classic form. The actual treatment of this capital as used by Scamozzi himself is shown in Fig. 120.

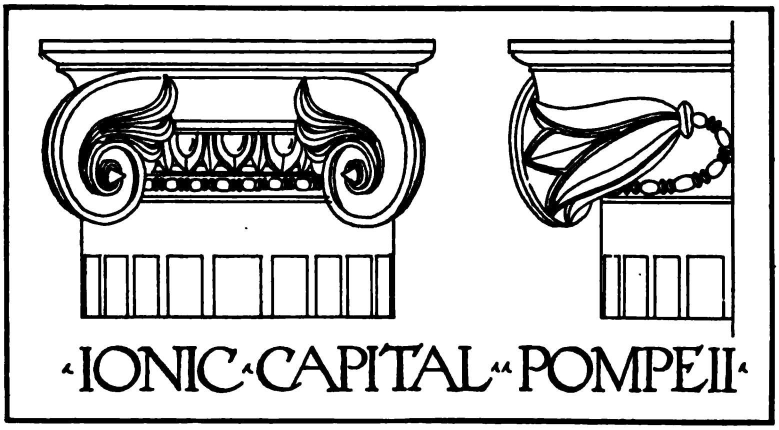
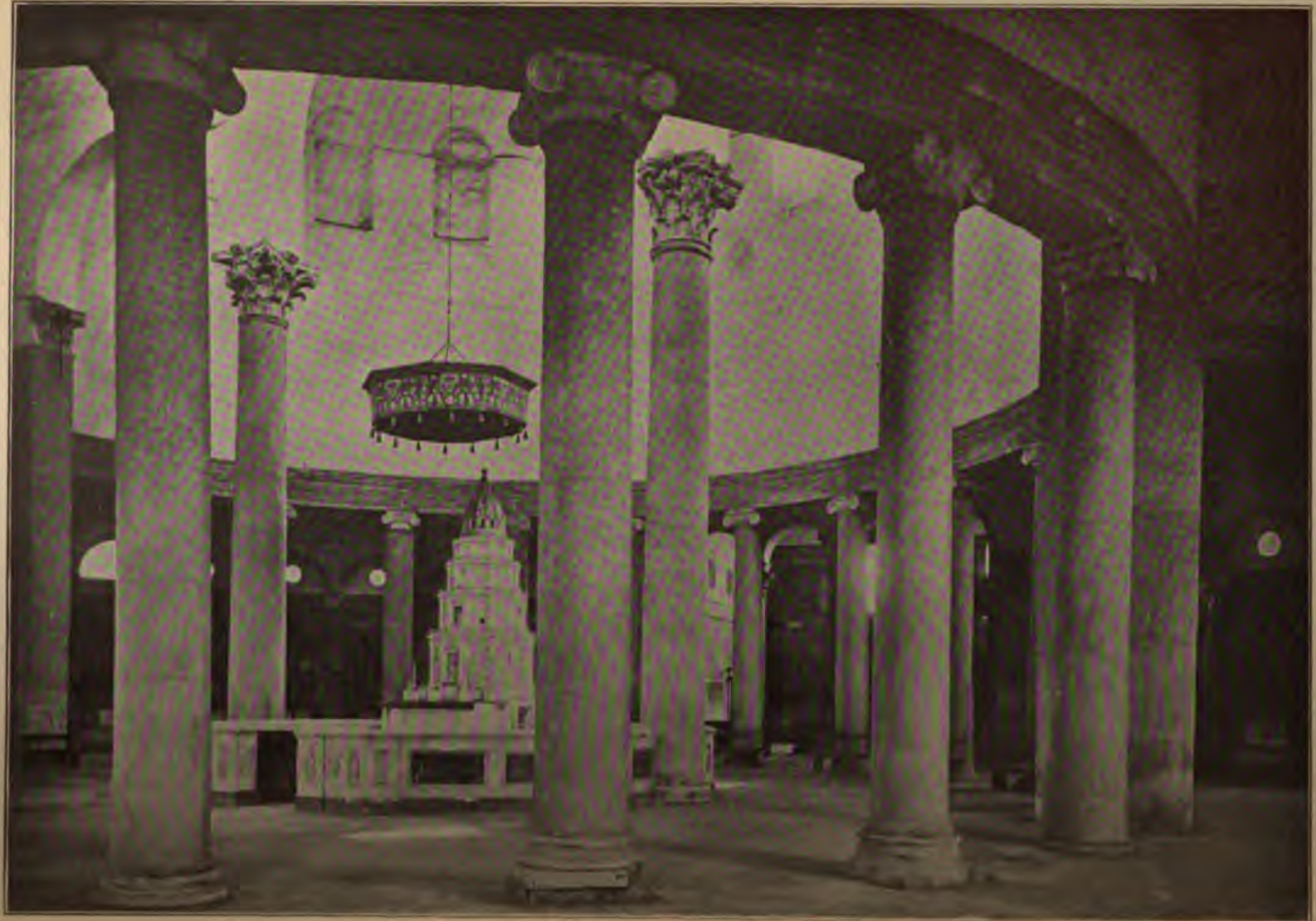


Fig. 121.

The earlier Roman Ionic Orders were evidently made by Greek workmen; and the capital from Pompeii shown in Fig. 121 clearly evidences this fact. In this example—that of an attached column—a rather interesting treatment of the volute on the angle is shown. Seen from the front, the volute is canted after the same fashion as it would be in order to make all four—or in this case, three—elevations of the capital agree; but on the end the roll is still employed, although treated in a somewhat free manner.

The Base. The base of the column shafts of the Ionic Order



Interior of Church of San Stefano, Rome; the Rotunda (Fifth Century).
Showing the utilization of various forms of older Roman column shafts and Ionic capitals.

offer little dissimilarity in treatment. This is very clearly shown in Fig. 122, in which A is from the Theater of Marcellus, and B from the Baths of Diocletian, both Classic examples, while C and D are taken from the columns of Palladio and Vignola. It will be observed that the form given by Vignola is rather an exceptional one, the general type being more nearly that shown by Palladio.

The Capital. The capital of the Roman Ionic column is fashioned after the same general manner as that described in detail in the Greek Ionic Order, but the mouldings are not so finely cut. The shaft was never given a necking, such as the Greeks, and later, some of the Renaissance architects, occasionally employed. It will also be noticed that the volute or spiral of the Roman Order is much less refined than in the Greek examples. It contains, moreover, fewer spirals on the face. Whether this paucity of spirals was occasioned by a lack of skill in the carver, or whether—as in the case of the use of the spiral in the Theater of Marcellus, on the second story—it was because these details were somewhat removed from the eye and therefore this simplification was to be preferred in the judgment of the builders, we do not know.

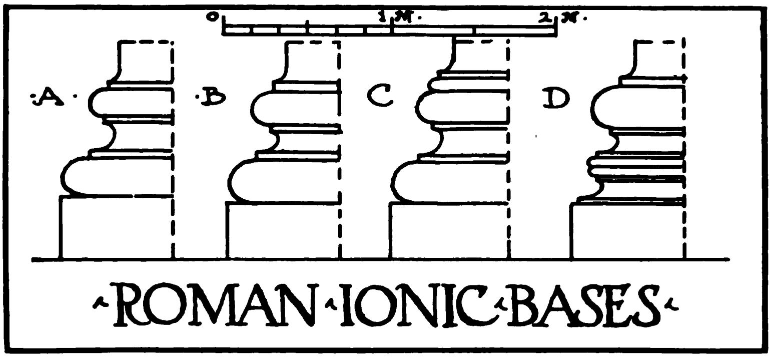


Fig. 122.

Fortunately the volute of the Romans is much more easily reduced to a rule than that of the Greeks. The Roman volute *may* have been laid out with compasses, while the Greek volute was certainly laid out in no such simple fashion. It has been suggested that, in the Greek Doric capital, the volute eye was filled with a round wooden plug, and that a string fastened to this and wound up around it would produce the concentric circles of the volute faces.

The Entablature. The architrave and frieze of the entablature

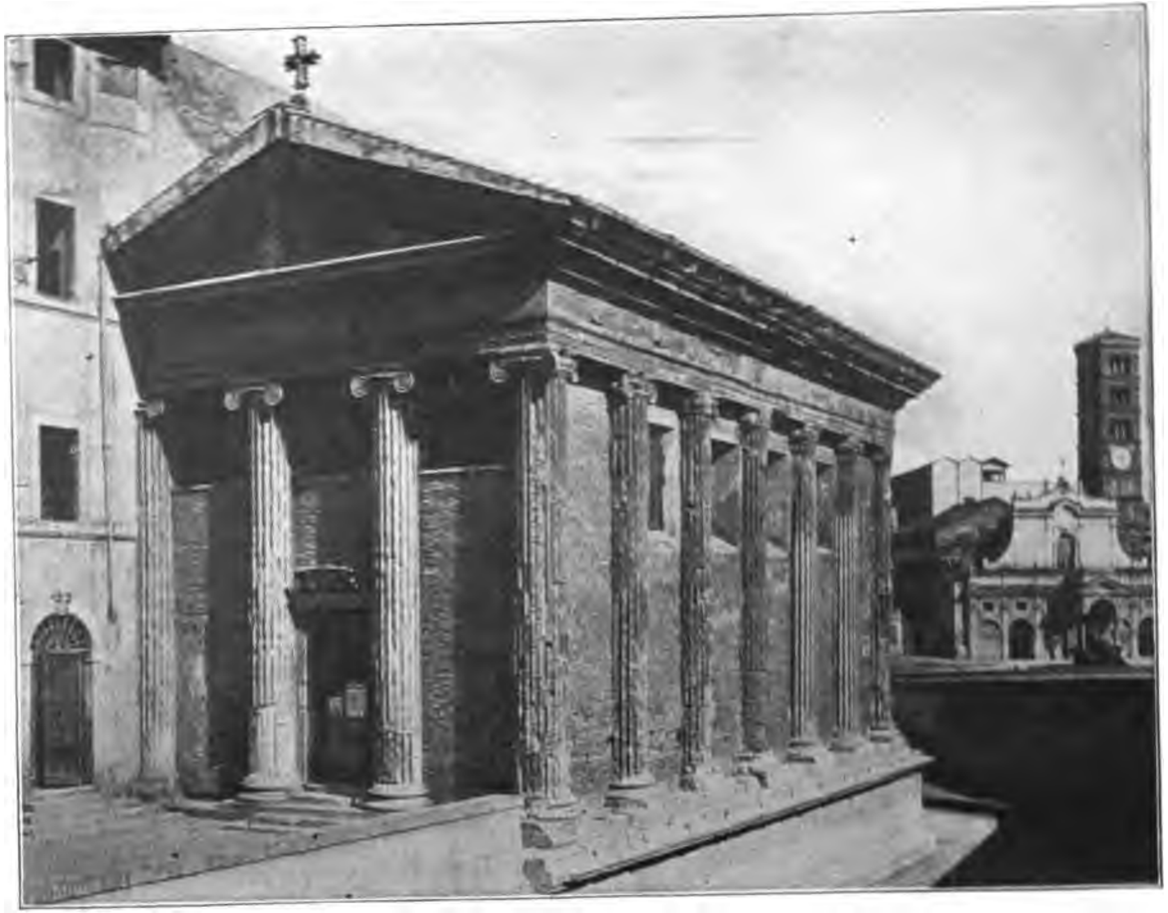


Fig. 123. Temple of Fortuna Virilis. Rome.

of the Roman Order is in the main similar to the Greek; but the cornice, in the general proportions and details of its mouldings, more nearly approaches that used with the earlier Corinthian column of the Greeks. The frieze is often elaborately carved, as in the Temple of Fortuna Virilis, Fig. 123.

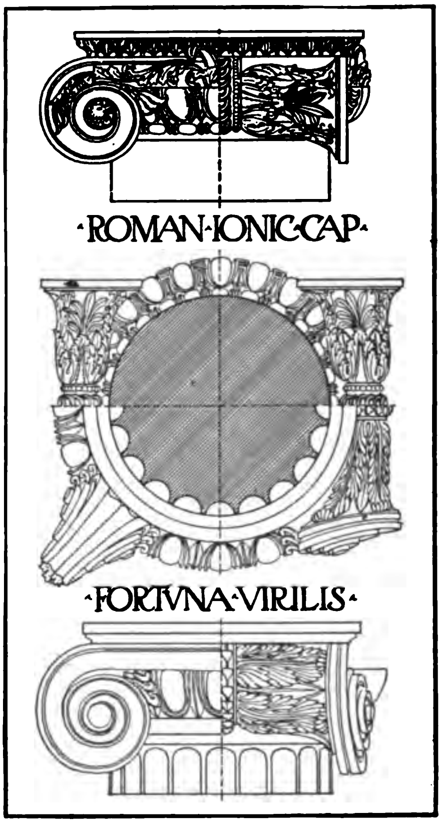


Fig. 124.

Examples. It is unfortunate that the continual tearing down of early Roman work, to which we have already referred, in order that successive Emperors might erect buildings in the locations already occupied by the structures of their predecessors, should have destroyed for us practically all the early architecture of the city of Rome. The result is, that, for examples of the Ionic Order, we are restricted to the two buildings which have already furnished us with a Doric column on the first story, and one other example—and that a very fine one—in the Temple of Fortuna Virilis, where fluted shafts are employed in the engaged columns which decorate the walls of the cella.

Fortunately we are able to indicate the chronological order in which these few examples were erected. The Temple of Fortuna Virilis, possibly of Greek workmanship, dates from the early part of the first century B. C., being probably erected before the arcade of the Tabularium. The Theater of Marcellus, 23 B. C., and the Colosseum, 72 A. D., followed. In one other Roman building, the Temple of Saturn, was the Ionic Order used, although here it is of a rather debased type.

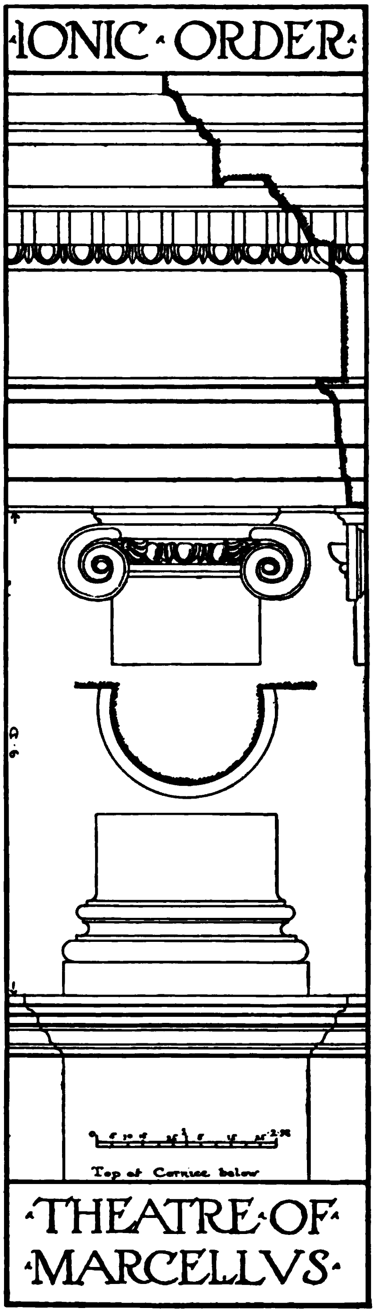


Fig. 125.

The capital from the Temple of Fortuna Virilis, as shown in Fig. 124, sufficiently displays the character of its cutting and the general "stubby" effect of the entire cap. The entablature used on this temple is rather crude in type, and is therefore not illustrated. The Roman Ionic cap shown in the upper part of the same figure, is a much more interesting, if later and more elaborate, example, and its general lines are more worthy of being copied. The examples of the Colosseum and the Theater of Marcellus are also to be considered as special uses of superimposed and engaged Orders on the second stories of these buildings. Of the two, that on the Theater of Marcellus is much the better, as it has been more carefully studied in proportion and detail as well as in relation to its position and to the entire building, than that on the Colosseum. This Order is shown in Fig. 125. The Order shown in Plate LI, on the left of the plate, is the pilaster used in the Baths of Diocletian at Rome, and is interesting for the proportions of its entablature, although this entablature is too fine in scale for the treatment of the column itself, where the coarse fluting and

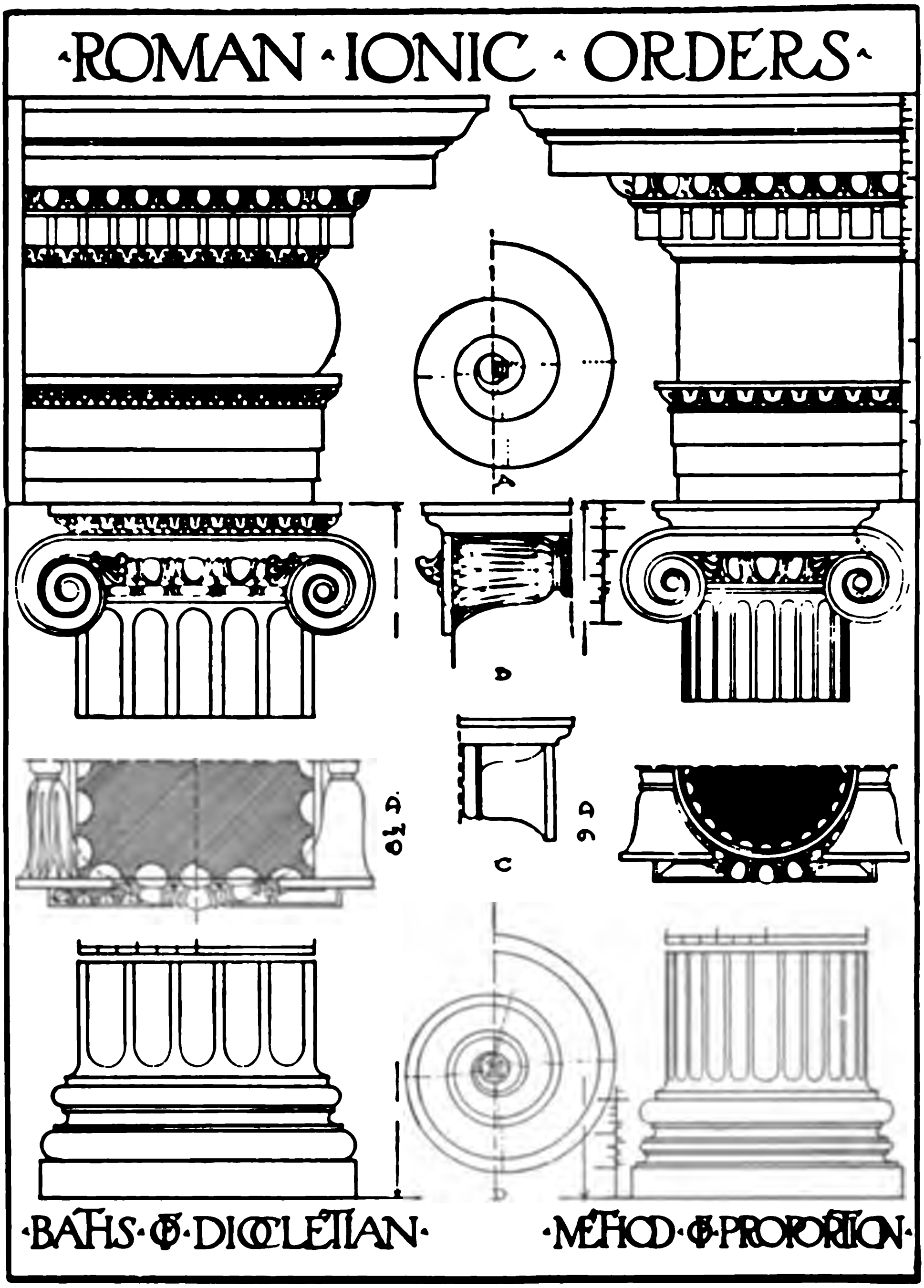


PLATE LI.

(A reproduction at small size of Portfolio Plate LI.)

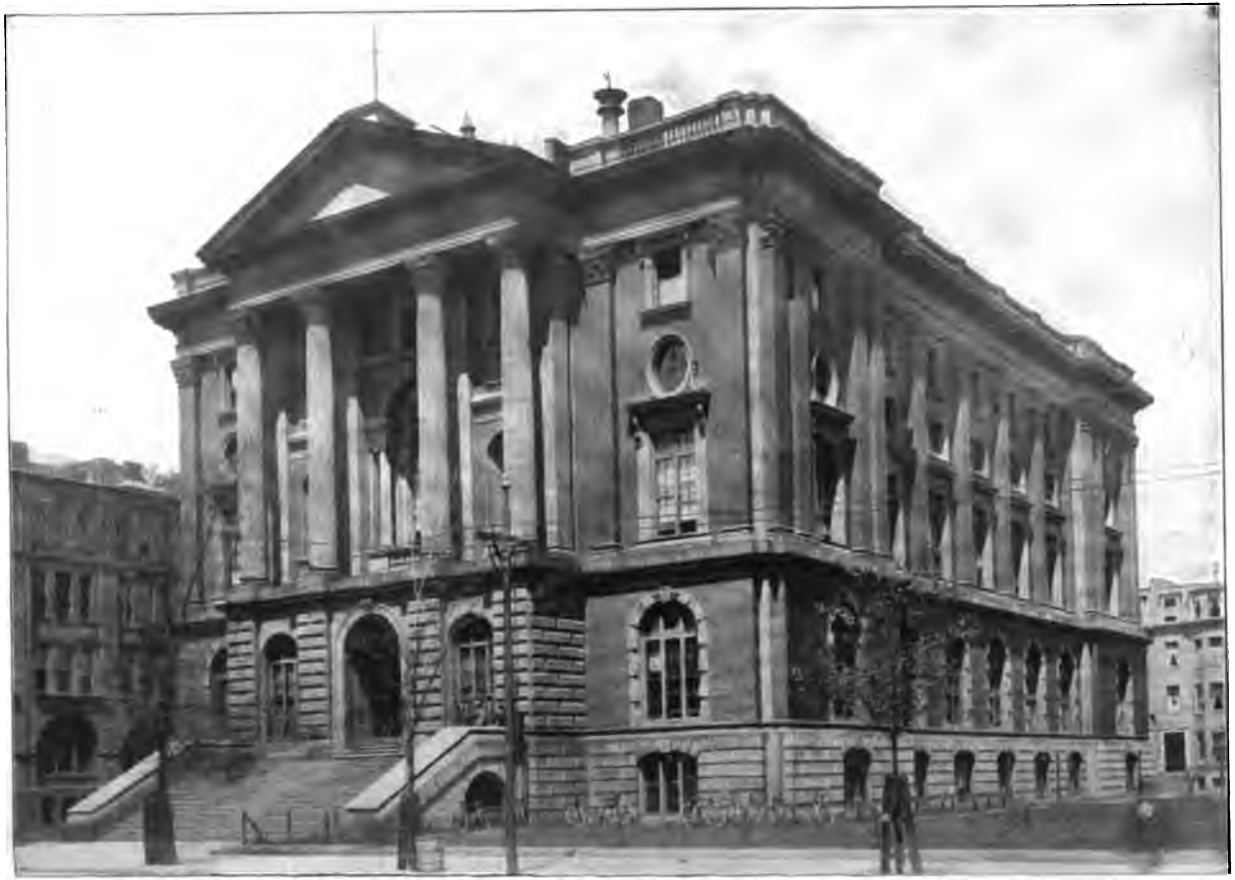
heavy cutting of the cap and base would ordinarily suggest a heavier and much less finely moulded crowning member. On this plate, at the right, is also shown a simple system of proportioning the Roman Ionic Order that should prove valuable in redrawing or reproducing a column of this general type. The Roman Ionic Order drawn in Plate XIII, Part I, shows on a larger scale the entablature and capital according to Vignola, and was supposedly adapted by him from the second-story Order of the Theater of Marcellus, perhaps the most beautiful example of antiquity. This plate should be compared with Fig. 125, in which the actual Order from the Theater of Marcellus is shown.

The Roman Ionic Order shown by Palladio is given in Plate XIV, Part I, and should be compared with that given in Plate XIII, Part I. Its special value lies in the fact that it shows a cornice with modillions, which in modern practice it is frequently desirable to use with an Ionic column; and a precedent for the proportions of the entablature when used in this way, it is sometimes difficult to find.

CLASSIC ROMAN CORINTHIAN

Transition from Greek to Roman Order, and Difference between the Two. A mere glance at the architecture of the Romans shows that they depended upon richness of ornamentation and tremendous size to make an effect upon the beholder. They found that the Corinthian Order proved to be much more valuable for this purpose than the simpler Greek architectural forms; and, with the possible exception of the Composite Order, it was this style that the Romans evidently most delighted to use.

Existing examples of the Corinthian Order far exceed in number any of the remains of other types; and it must be acknowledged that, taken at its best, there are Roman examples of this form of column and capital that excel the earlier Greek experiments. This suggested comparison must be qualified by the further statement, however, that there is no instance of what may be considered an exactly parallel treatment of the Corinthian style by the two nations, inasmuch as the Greek examples of the Tower of the Winds and the Monument of Lysicrates are quite radically different from the succeeding Roman Corinthian. It must also be said that there is no Roman example which equals in delicacy, refinement, or strength, that used in the Tholos at Epidauros, a pure Greek type.



ROGERS BUILDING, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON, MASS.
The Corinthian Order is Used as a Decorative Feature of the Building

As already intimated, the Corinthian Order may be considered as typically Roman in spirit and development, in the same way that the Greek Doric may be considered typically Greek. The final development of the Roman Corinthian capital differs materially from the three well-known Greek examples; indeed, the only features they possess in common are the character of the leaves used in covering the bell outline of the capital, and the general arrangement of the capital itself. The foliage varies greatly in the different examples. In much of the Roman work it is neither as decorative, as conventional, nor as refined as in Greek examples, and generally corresponds more nearly with the natural forms.

The capital is the most distinguishing feature of the Corinthian Order, and it is always first considered in any description of this style of architecture. In general it may be said that the Roman Corinthian capital is based upon the form used in the Temple of Jupiter Olympus at Athens. (See Plate LII.)

The great confusion naturally attending the erection of buildings by the Roman Emperors, though executed wholly by Greek artists, architects, and workmen, makes it somewhat difficult to establish a dividing line between Greek and Roman work in certain well-known architectural monuments. The capital from the Temple of Jupiter Olympus is an instance in evidence. This building is variously termed Greek or Roman by different authorities, according to their own personal leanings. It has finally seemed best to include the Corinthian Order from this temple (sometimes called the Temple or Aqueduct of Hadrian) as Roman work, although it was undoubtedly carried out and executed by Greeks, and that, too, at a period when their native taste cannot be supposed to have been much affected by Roman influence. Nevertheless, this individual example is so nearly allied to the later Roman treatment that it may be considered along with their form of the Corinthian capital rather than with the other—and very different—examples which we have already found in Greece itself.

It must not be forgotten, however, that this Order is of Greek workmanship; and so, historically, it occupies a position midway between the earlier Greek experiments and the Order that the Romans later carried to so great a degree of perfection. Not only does this apply to the capital—in which the awkward carrying out of the upper plinth or abacus to a sharp point on the corner should be noted—but

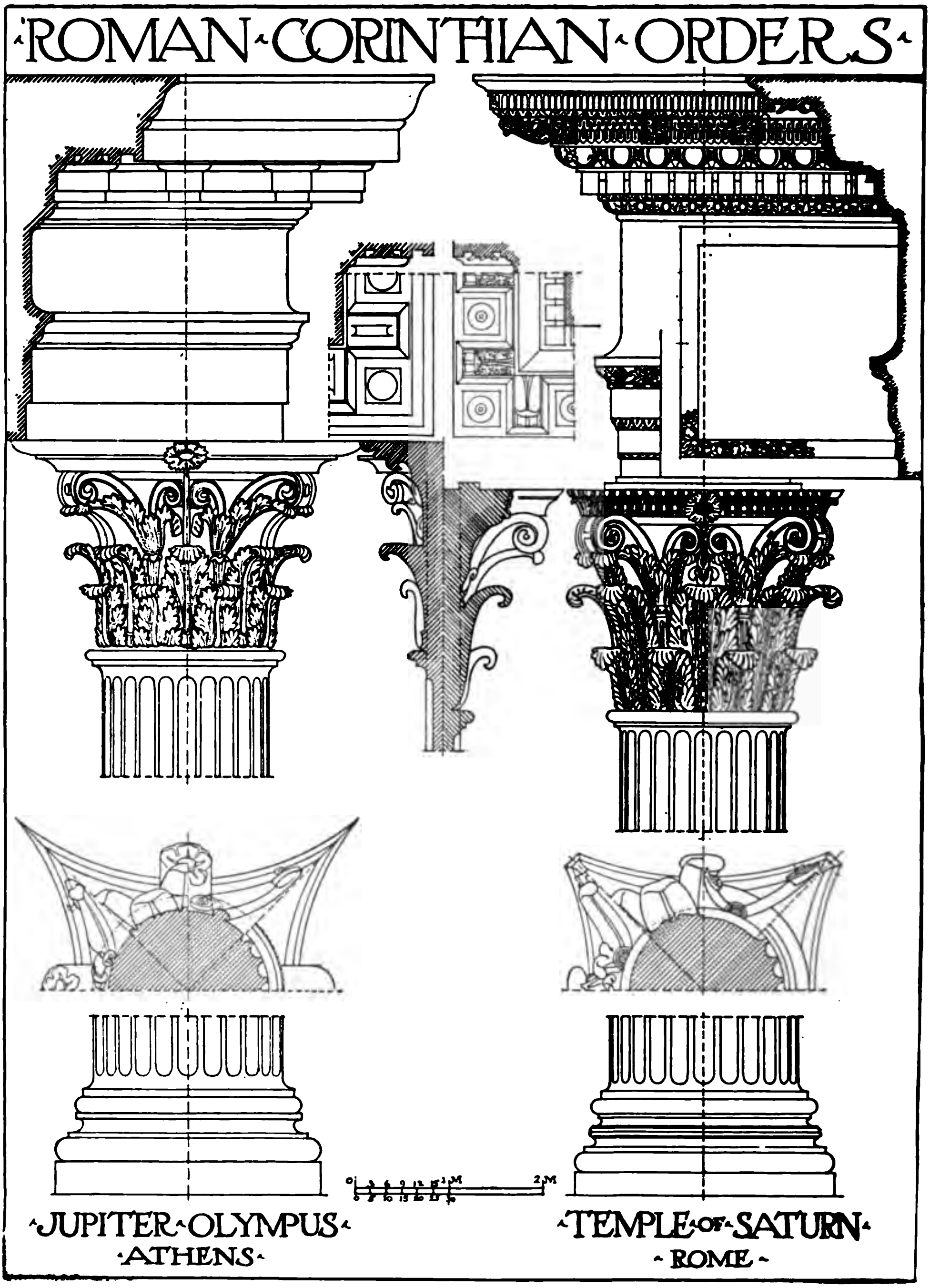


PLATE LII.

(A reproduction at small size of Portfolio Plate LII.)

also to the entablature itself, which later it may be interesting to compare with that used on the Monument of Lysicrates, along with some of the later Roman entablatures.

There are only two types of bases used with the Corinthian column by the Romans. Both of these types are shown in Fig. 126. At A is shown the base moulding from the Temple of Hadrian at Athens; and at C, the form given by Palladio. This latter example may be taken as the most nearly typical form of Corinthian usage; those on the Basilica of Antoninus and Faustina and the Arch of Constantine, for example, are even simpler, being the same as the Palladian Ionic bases shown at C in Fig. 122. More elaborate forms, but forms that are rarely used to-day, probably because the modern Corinthian Order seldom equals in size the Roman type to which the many members of these bases are especially suited, are shown at B and D in Fig. 126, the first being from the Temple of Saturn, and the second from the Order of Vignola.

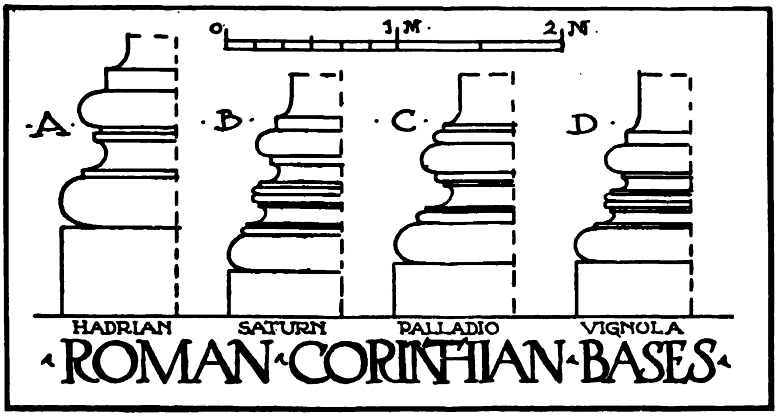


Fig. 126.

While it has already been said that the chronological sequence of Roman architecture is not materially important in following its process of development, still it is instructive to trace as nearly as possible the date-relation of the different examples, as this will help more or less to show the development and decline of the style in the different Roman periods. Some of the later Roman architecture is as pure as the earlier work; and some of the earlier work is as debased as most of that done during the third century. As a rule the Roman architecture of about the period of Augustus is the most refined, but during the reigns of both Trajan and Hadrian, there was evidenced a Renaissance or tendency to return to the beauty and purity of the earlier period.

Temple of Jupiter Olympus, Athens. It is well, then, to remember that the Temple of Jupiter Olympus at Athens, begun about 170 B. C., the Order from which is shown in Plate LII, was finished about 117 A. D., by Hadrian. The design of the capital was probably determined at a date near the beginning of the work, possibly by Cossutius, although it is likely that the workmanship of many of these capitals belongs to a much later date. The columns of this temple were 58 feet in height.

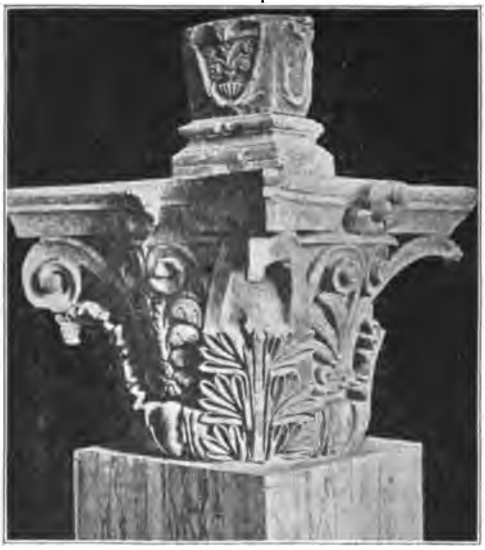


Fig. 127. Early Corinthian Capital.

An early Corinthian capital (Fig. 127), taken from the church of S. Niccolo in Carcere, shows a capital, evidently of Greek workmanship, which bears a close relation to those employed in the Temple of Jupiter Olympus at Athens.

Temple of Castor and Pollux, Cora. The capital from the Temple of Castor and Pollux (Fig. 128) is one of the remains found at Cora, and is as undoubtedy of Greek workmanship as it is an early Roman example of the Order. This is another of the drawings by Emanuel

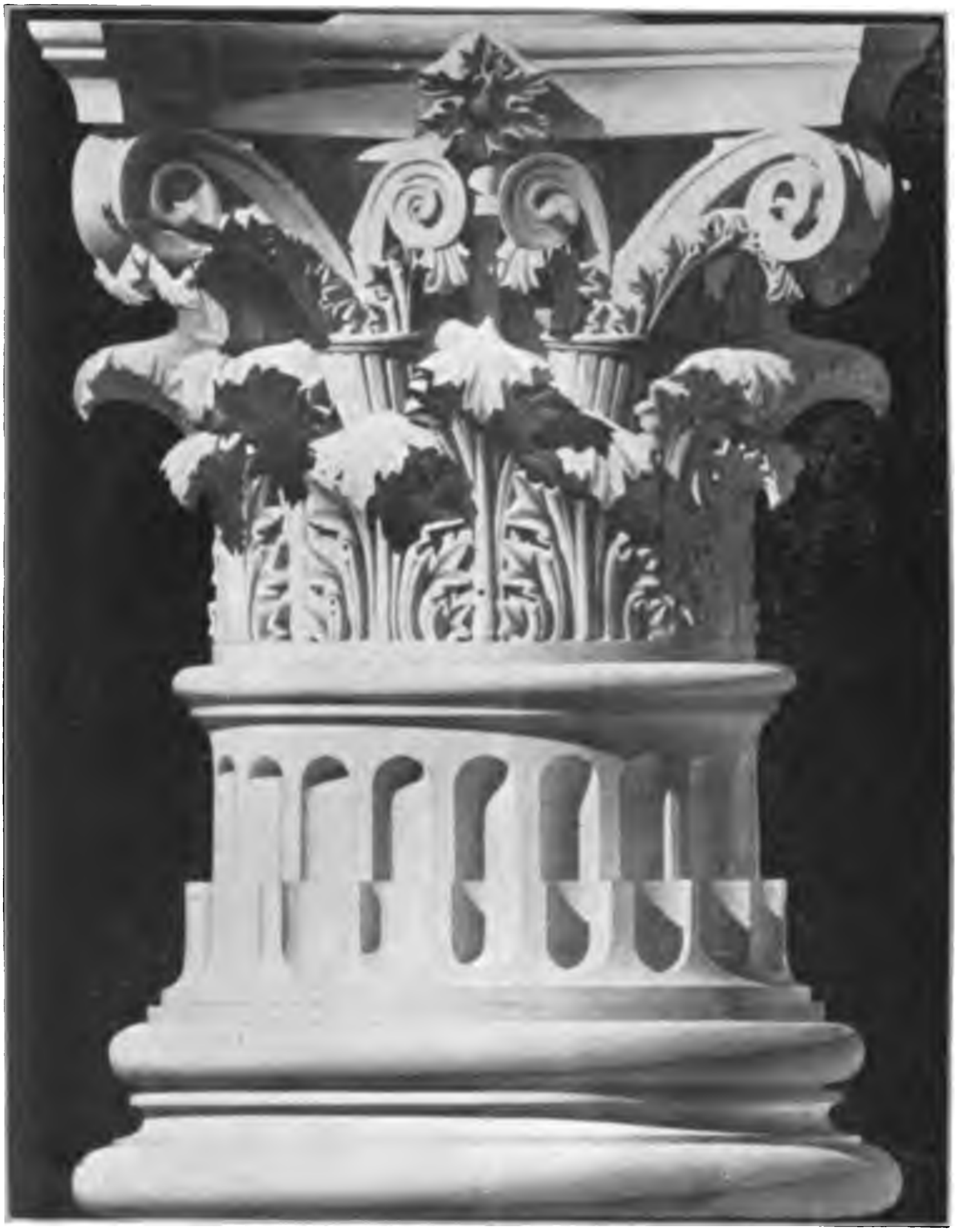


Fig [illegible] Roman Corinthian Capital and Base (Restoration.)
From drawing by Emmanuel Brune

Brune. The base is an interesting example of an early Roman Corinthian outline; and the capital is somewhat shorter in proportion than the later Roman type. The leafage and ornamentation are very near the Greek in feeling, and it should be noted how closely the leaves in their profile follow the growth and emphasize the outlines of the column itself. The capital already referred to and shown in Fig. 109 is probably of about the same date; and both these examples, along with the two or three other earliest Roman uses of the Order, show a method of treatment and a strength of outline that is too often lacking in other Roman work.

Temple of Mars Ultor, Rome. Among the earliest Roman buildings upon which this Order was employed, is the Temple of Mars Ultor or Mars Vengeur, dating from about 42 B. C., of which three columns remain standing in the Forum. This building, backing up against the Quirinal Hill, formed a part of the Forum of Augustus, and already displays a beautifully developed Roman type (Fig. 129). This Order is shown in an engraving from another of the famous Brune drawings, the original being the property of the Massachusetts Institute of Technology. The original was drawn at a scale of two centimeters per meter—about equivalent to the one-quarter inch scale of our system of figuring. The tremendous size of the building, and the scale of the different parts, may be estimated from the steps and the height of the figures shown in the lower portion of the drawing. Aside from the beauty of the rendering, the student should notice particularly that the columns are all rendered very lightly, the general effect being almost white in front of the background, which, although not entirely in shadow, is rendered darker to show that it is on a plane farther back than the columns. This drawing displays with unusual beauty of rendering the shafts and full proportions of the Roman Corinthian Order, and, incidentally, a very restrained example of a Roman doorway appropriate for use with the Corinthian column.

The Temple of Concord, rebuilt by Augustus approximately 7 B. C., has an extremely beautiful capital and entablature. The capital contains two ram's heads used in the place of the more conventional corner volutes; but this eccentricity, with the consequent loss of sharpness of outline of the capital itself, is not sufficient to spoil the effect of the Order as a whole.

Fig. [illegible]. Detail from Temple of Mars Vengeur, Rome (Restoration.)
From drawing by Emanuel Brune.

Pantheon, Rome. The portico of the Pantheon is of earlier date than the remainder of the building. This building was erected—on the site of an earlier temple built by Agrippa—some time during the reign of Augustus (B. C. 27—A. D 14); and the present entrance portico contains eight columns of the original ten-column pedimented end of the older building. This accounts for the fact that the sides of the brackets, or modillions, in the cornice of the pediment are not exactly perpendicular, but slightly inclined. This difference would naturally occur in adapting the two inclined cornices of the earlier pediment to the different slope required by the narrower base of the new pediment face. The dentil course in the cornice has never been carved (see Plate LIII). The columns from both the interior and the exterior of the Pantheon are superb forms of the best type of Roman Corinthian. The round part of the building dates from about 120 A. D. The Orders used on the Pantheon are of a special interest from the fact that this building shows side by side the different workings out of the same Order when used on the exterior and interior of a monumental building. Therefore the differences displayed in the various proportions and relations of the mouldings and the placing of the ornament in these two Orders, are most suggestive, and, until the reasons covering their arrangement are apprehended, will deserve careful study.

Temples of Vesta. There are two Temples of Vesta, probably both erected during the reign of Augustus. The one in Rome, of which three slender columns are still standing in the Forum, was one of the most beautiful examples of Roman architecture, and was probably of Greek workmanship. The other, a circular temple overhanging the gorge of the river at Tivoli, has a capital very similar in general character and outline to the two examples illustrated from Cora. The temple itself has a cella, which yet retains one of its two windows and a doorway, the latter illustrated separately on a plate that is referred to later. This cella is 21 feet in diameter, possibly of an earlier date than the 18 columns of the peristyle which surround it. These columns are 18 feet 5 inches high, and are placed on a podium 6 feet high. The columns, it will be seen, are rather stumpy in effect, being only about 9¼ diameters high, with the capital 1 diameter—proportions of unusual strength, and evidently in part adapted to the location of the temple on the top of a cliff overhanging the river

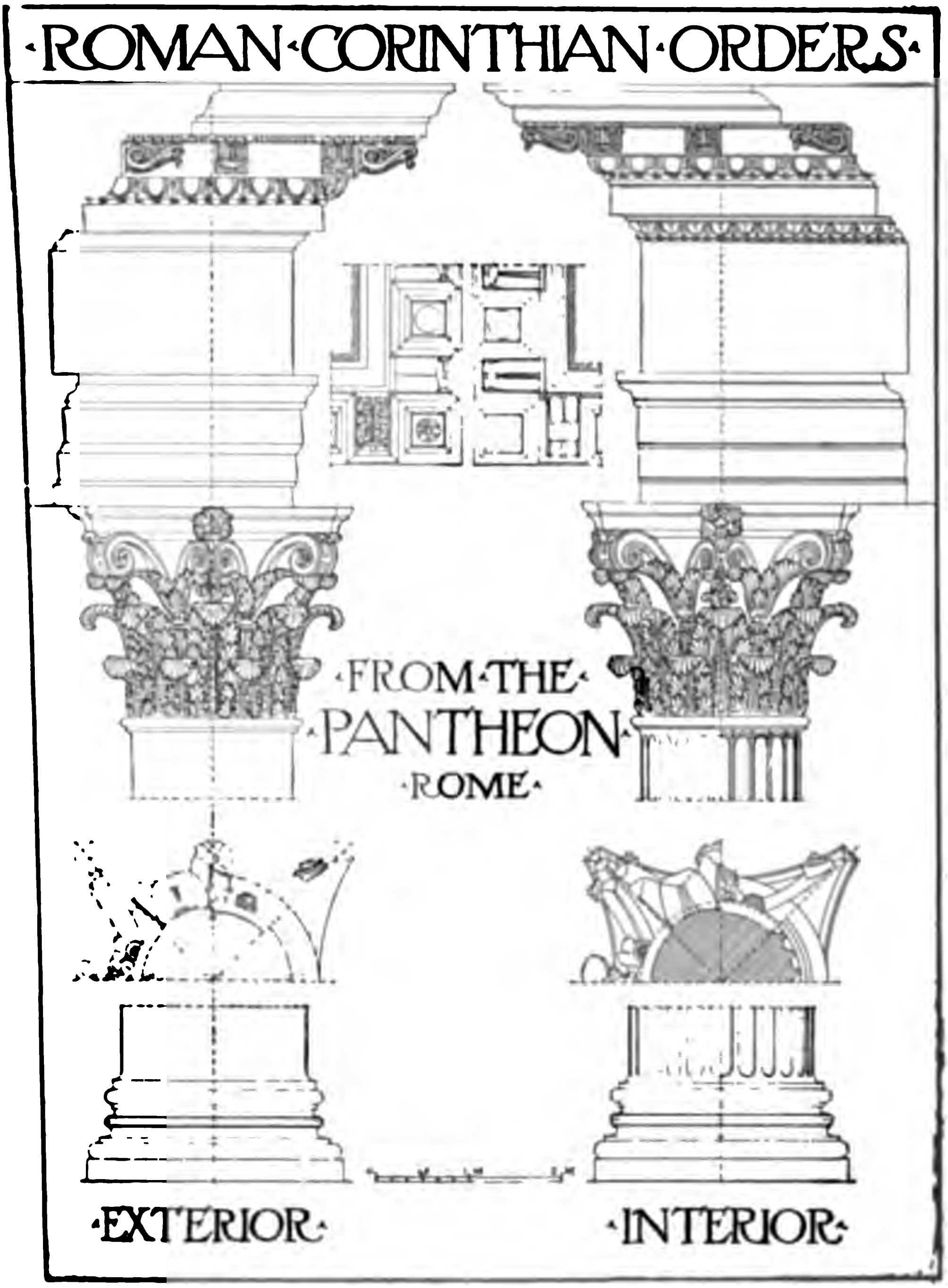


PLATE LIII.
(A reproduction at small size of Portfolio Plate LIII.)

below. The carving of these capitals is especially vigorous and most effectively suited to the proportions of the column shaft. (See Fig. 130).

There is much knowledge of Greek precedent displayed in this remarkable example; but the treatment is yet novel, original, and, all in all, one of the most interesting capitals of the Roman Corinthian form. There is a vigor in the placing, cutting, and distribution of the members that displays great strength, virility, and feeling on the part of its designer.

Comparison of Three Examples. The height and proportions of the columns of three of the best-known examples of the Corinthian Order may be interestingly compared. The column used in the Portico of the Pantheon is 45 feet 3 inches high; in the Temple of Castor, 48 feet 3 inches; and in the Temple of Mars Ultor, 57 feet 9 inches. The proportions of their diameters to their heights are respectively 1 to 9¼, 1 to 10½, and 1 to 10, including the square plinth; the inter-columniations are 2⅐, 1½, 1⅓, respectively. The sturdier or heavier the column, the greater the intercolumniation.

Temple of Minerva, Assisi. There is an example of the Augus-

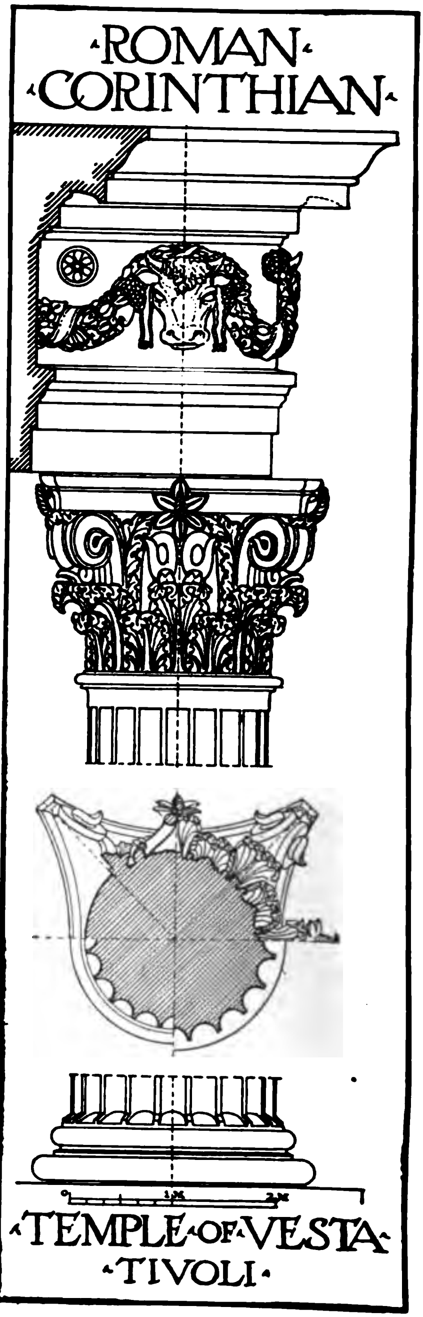


Fig. 130.

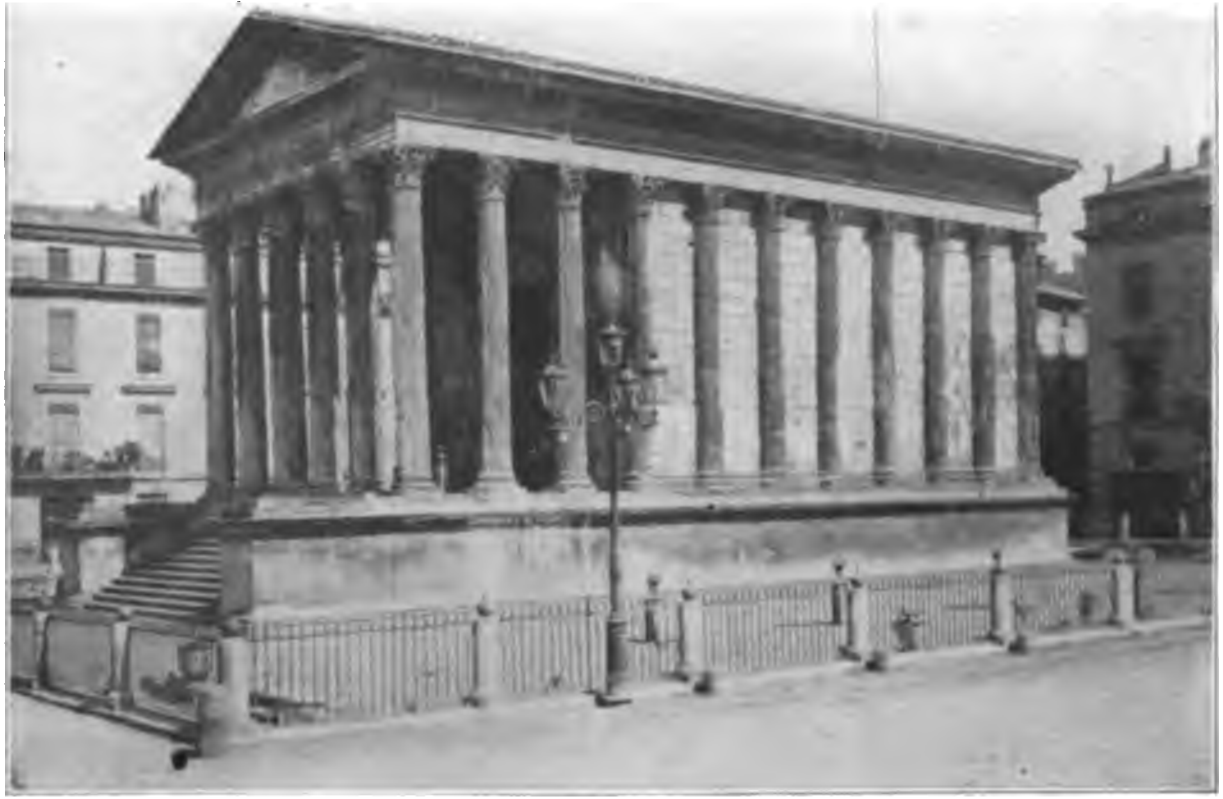
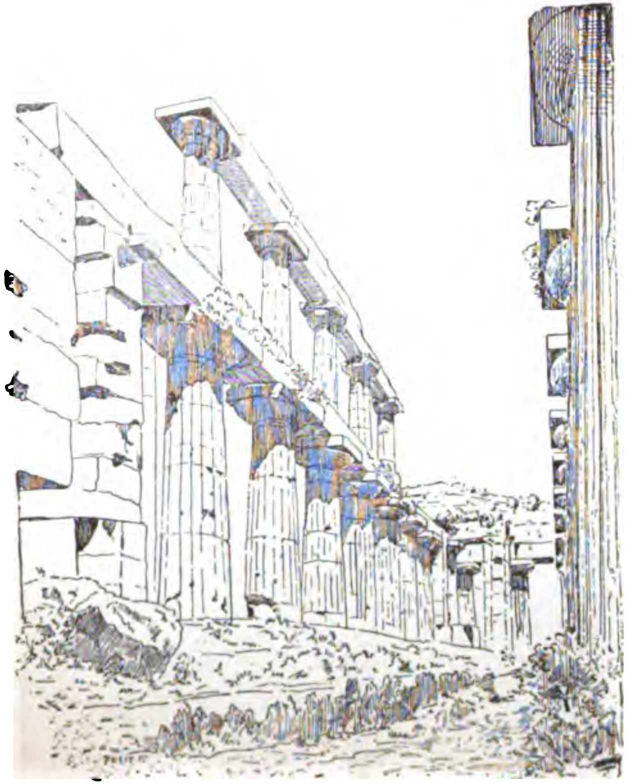
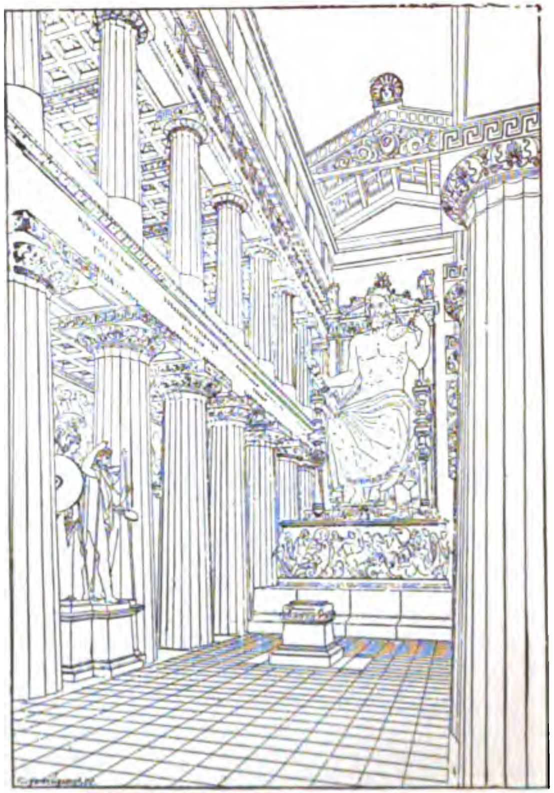


Fig. 121. Maison Carrée, Nimes.



Interior of Grand Temple at Pæstum.

Showing present condition of remaining columns of upper colonnade.



Interior of a Greek Doric Temple (Restored).

Showing Greek superposition of Orders in temple cella, to take care of extra roof height

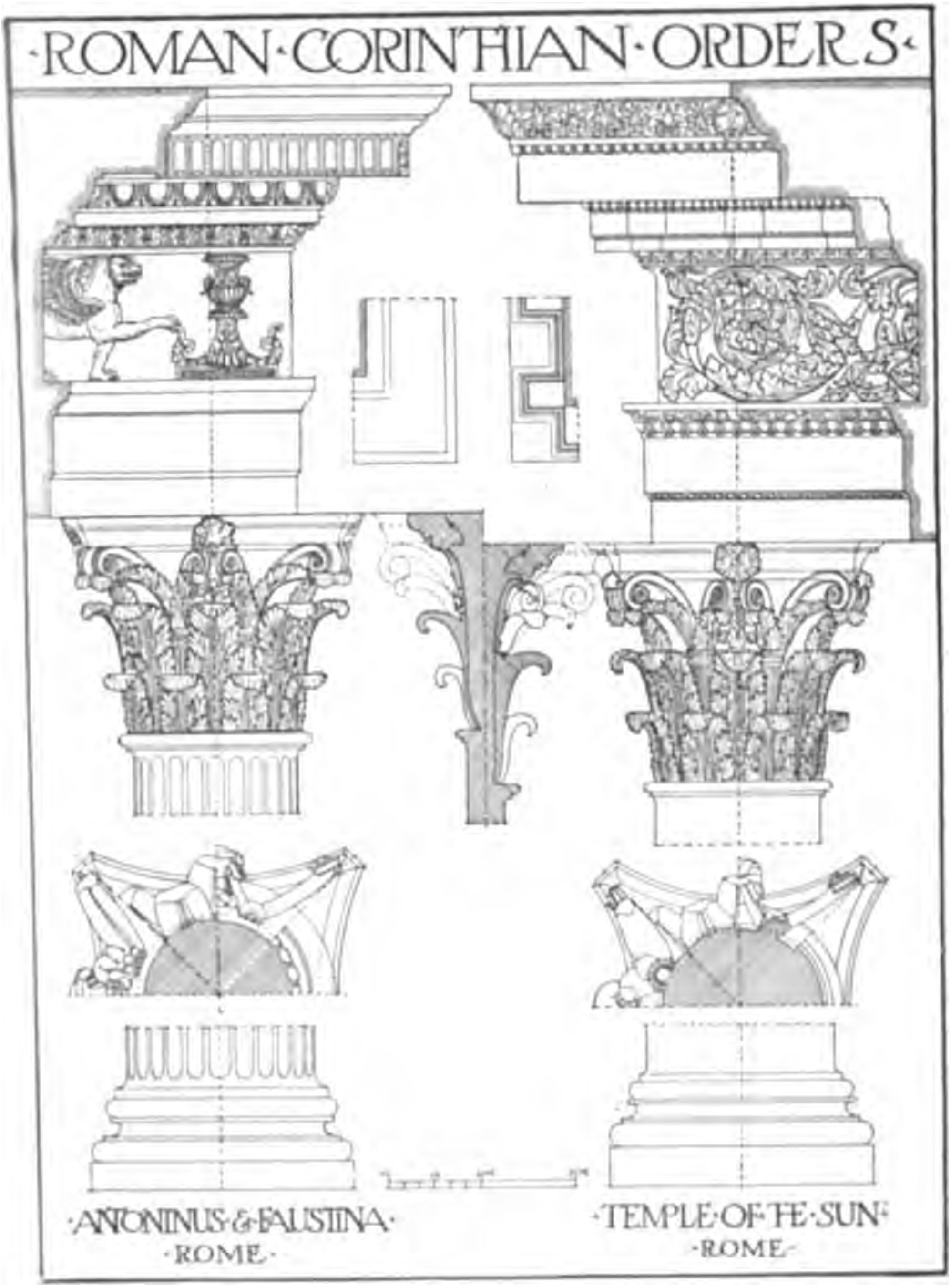


PLATE LIV.

(A reproduction at small size of Portfolio Plate LIV.)

tan era that is comparatively little known—that of the Temple of Minerva at Assisi. The capitals resemble those of the Temple of Castor and Pollux at Cora. The steps of this example are carried back between the columns, which therefore have the appearance of being placed on pedestals. This is the only Italian example of this custom, although it is occasionally found used in Syrian buildings, where pedestals are frequently used with the Corinthian as well as with the other Roman Orders.

Temple of Antoninus and Faustina, Rome. The Temple of Antoninus and Faustina is an exceptionally pure example, although of late date. Possibly a Greek artist may have been employed on this work, in which case its beauty and refinement may be explained by that fact. This temple is shown in Plate LIV, and is of special interest owing to the unusual judgment displayed in the ornamentation of the entablature. The carved members are here alternated and contrasted with the plain mouldings, with a reserve and discretion that is seldom attained in Roman workmanship. The capital suggests a study of the better and earlier Greek and Roman forms.

Temple of Nimes, France. The *Maison Carrée* or Temple of Nimes in France (Fig. 131), to which the approximate date of 122 A. D. has been given, may certainly be included within the dates marking the beginning and the end of Hadrian's reign (117–138 A. D.). This temple is rectangular in shape, and is raised on a podium and approached by a flight of steps. The columns of this temple are 30 feet high, with a diameter of 6 feet 9 inches, and the intercolumniation is two diameters. This building is to-day in an exceptionally good state of preservation.

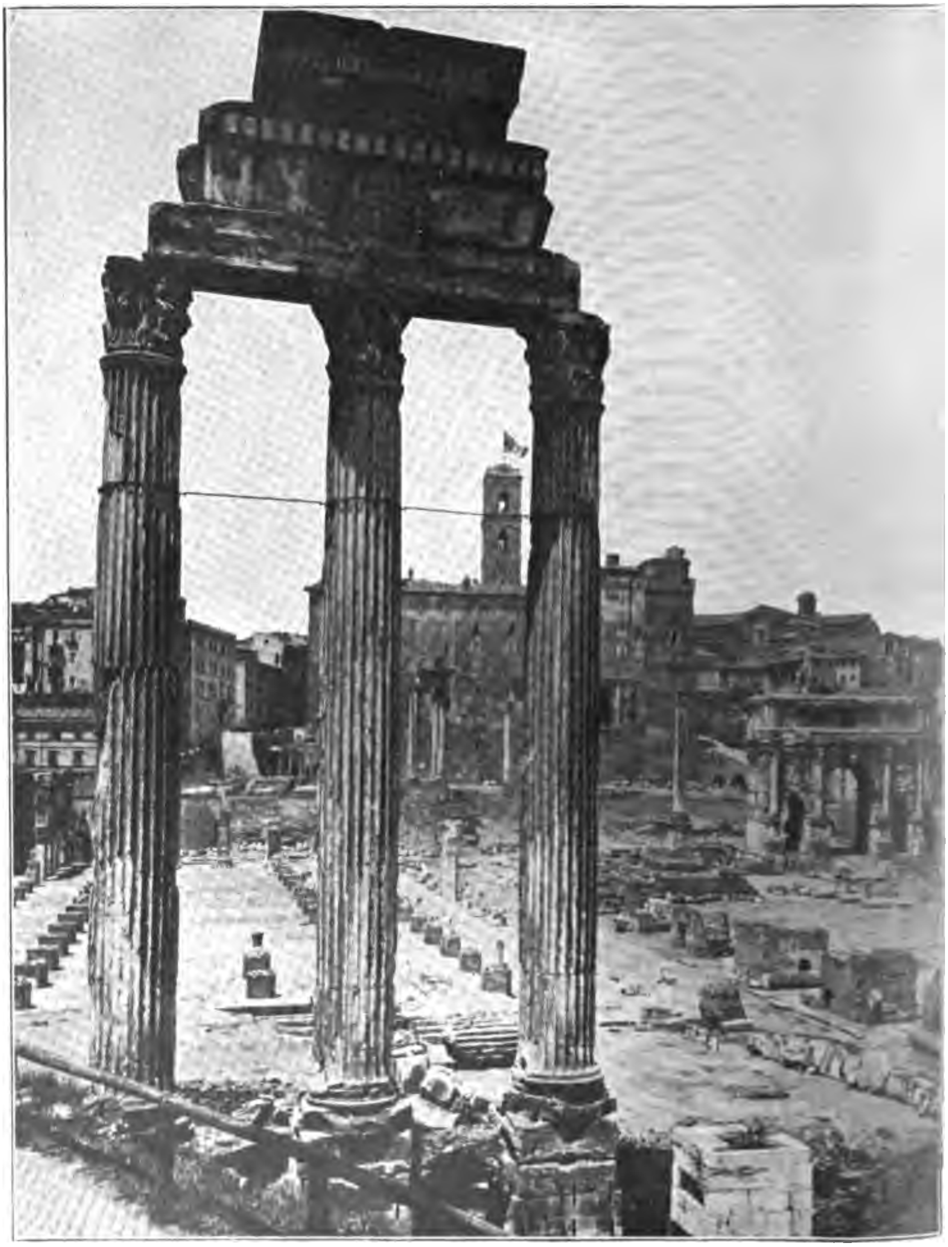
Temple of the Sun, Rome. On the same plate with the Order from the Temple of Antoninus and Faustina (Plate LIV), is shown the Order from the Temple of the Sun on the Quirinal Hill. This building, otherwise called the Frontispiece or Portico of Nero, was built by Aurelian on his return from Palmyra in 273 A. D., and the work is exceptionally refined in character for so late a date. The carving and ornamentation are here arranged with a discretion worthy of work of a better period. The form of the entablature itself is unusual, with the brackets that were afterwards relegated to be used with the Composite Order; and the modillion course forms the principal member of the bed-mould: but the proportions to one another of the separate parts of this cornice are remarkably successful, and the foliated scroll carving of the frieze is done with such strength and vigor of composition that its use is here amply justified. A fault which is more apparent in the plate than in the actual building, is that the entire entablature is somewhat heavy and over-large in scale for the diameter and thickness of the column and capital which support it. The column is 58 feet high, and the entablature is nearly 16 feet high.

Comparison of Early and Late Examples. It should be noticed that each of these Orders increases in elaborateness of carving and of design over its predecessors. In certain of them, this has resulted in a mere complexity of moulding and carved detail, often without sufficient meaning or apparent reason, and without due relation to its place or to the moulding which it is intended to ornament. The capitals themselves display this same retrogression; and in place of the crisp leafage and cutting, the firm upright lines, the decision of composition, and the boldness of massing of the Greek and early Roman examples, they run to mere profusion of ornament. The outline appears flabby, and the capital of insufficient strength to resist the superimposed weight. The bell of the capital is so entirely covered with foliage that it is merely restless and monotonously uninteresting in mass.

This difference is well contrasted in Plate LII, where an early example (the one used on the Temple of Jupiter Olympus at Athens) and one of the late Orders (that of the Temple of Saturn at Rome) are both shown together. The first is partly Greek, and therefore restrained in its design; the last, wholly Roman and therefore overflorid in its ornamentation.

Vignola's Corinthian Order. The Order shown in Fig. 132 is the version of Roman Corinthian given by Vignola, and, while founded on old examples, it actually dates from the period of the Renaissance. To this same time also belongs the example shown in Plate LV, displaying the method of construction.

Vignola's example of the Corinthian Order is supposed to be derived from the various monuments in Rome, and particularly from the circular Temple of the Pantheon, and from three columns which are still standing to-day in the Roman Forum. After having compared all their details and proportions, he established a rule which, without materially differing from the ancient forms, gives such a relation that a modillion always occurs on the axis of the column; and the eggs-and-



Roman Corinthian Columns from Temple of Castor and Pollux.
In the Forum, Rome.

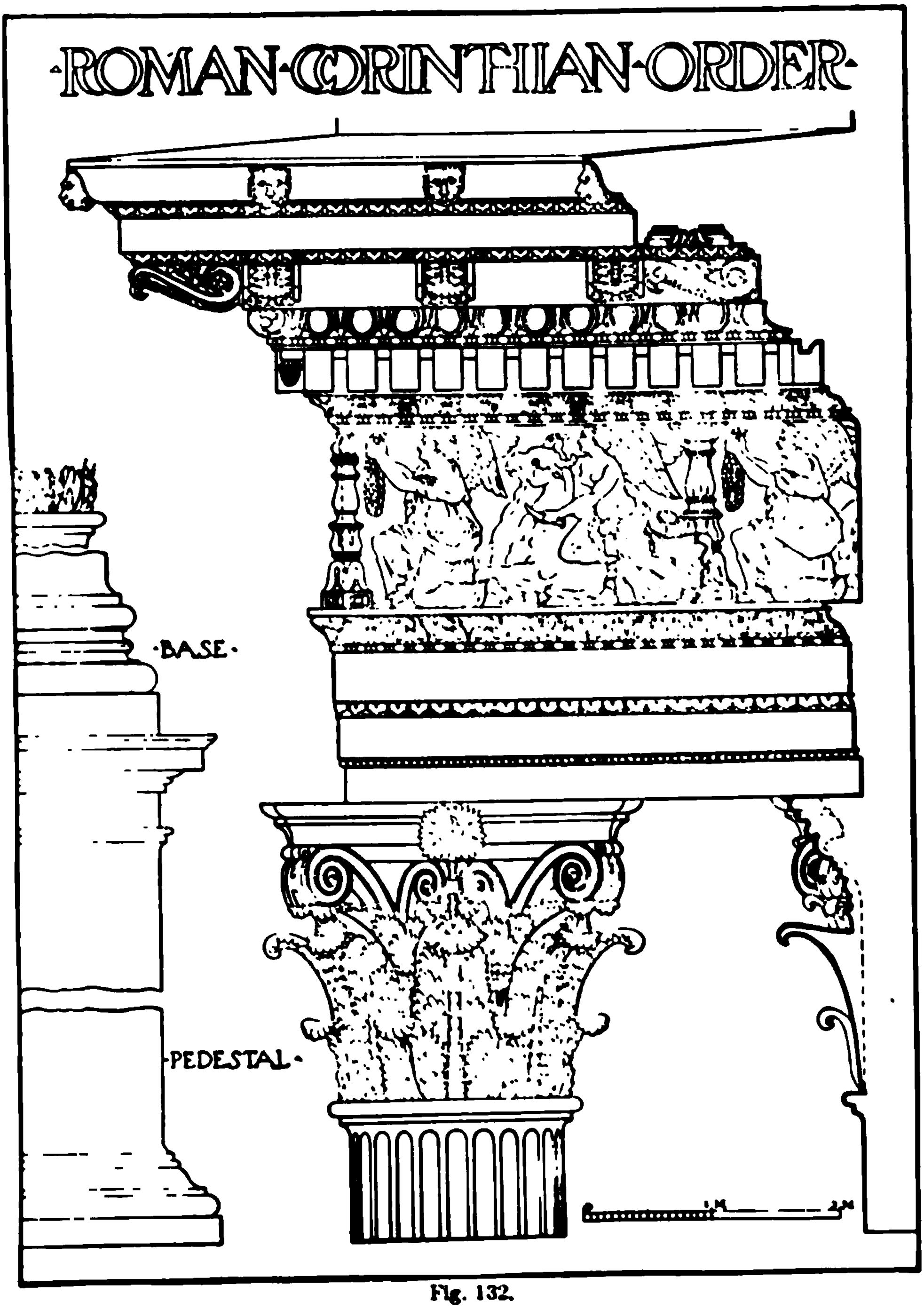


Fig. 132.

darts, dentils, and other moulding ornamentations also correspond in axis with the columns, as may be found by drawing out this Order with the measurements given. The base of this column is similar to that already shown in the Ionic example, Plate XIII, Part I; both being derived from the Greek Attic base, but the Corinthian base is more subtly moulded and generally includes one or two members more than the Ionic. In both these bases the members are round in plan, and end in a torus resting upon a plain plinth, square in plan and rectangular in elevation.

The pedestal of this Order is sufficiently well explained in the plate itself, but it may again be repeated that the pedestal is not so much an authentic part of the Roman Order as it is a creation of the Renaissance. On this plate the pedestal is shown with a necking which cannot be considered as an invariable adjunct to its use with the Roman Order. The capital itself, in this example, may be criticised not only for lack of refinement in the treatment of the foliage, and over-luxuriance in the method of its application, but also for a certain clumsiness directly attributed to the thickness through the capital being greater than the diameter at the neck of the column, and to the fact that the foliage has a tendency to swell out too rapidly, making too great a contrast with the slender outline dimensions of the shaft below. This tendency has been corrected in later work, although indeed it does not show at all in the Greek capitals; and to-day one of the surest characteristics of the best Colonial work is that this Corinthian capital is carried up with the leaves held back and restrained to follow the plane of the column below for some distance, curving out only at the top, below the volute and smaller cauliculi. The abacus of the Order is hollowed out on the four sides and moulded as in the Greek form.

The entablature of this Order is essentially different from that of any that we have heretofore seen, and may be considered as being more distinctly Roman than any other detail of the Corinthian Order. The architrave is divided into three fascias or bands, separated by a small moulding, generally ornamented. Indeed, even the plane faces of the bands themselves are sometimes elaborately carved. The frieze is often carved profusely in high relief. The cornice includes the mouldings of the Ionic dentiled bed-mould, with the addition of a series of brackets or modillions (Fig. 133) quite different from the

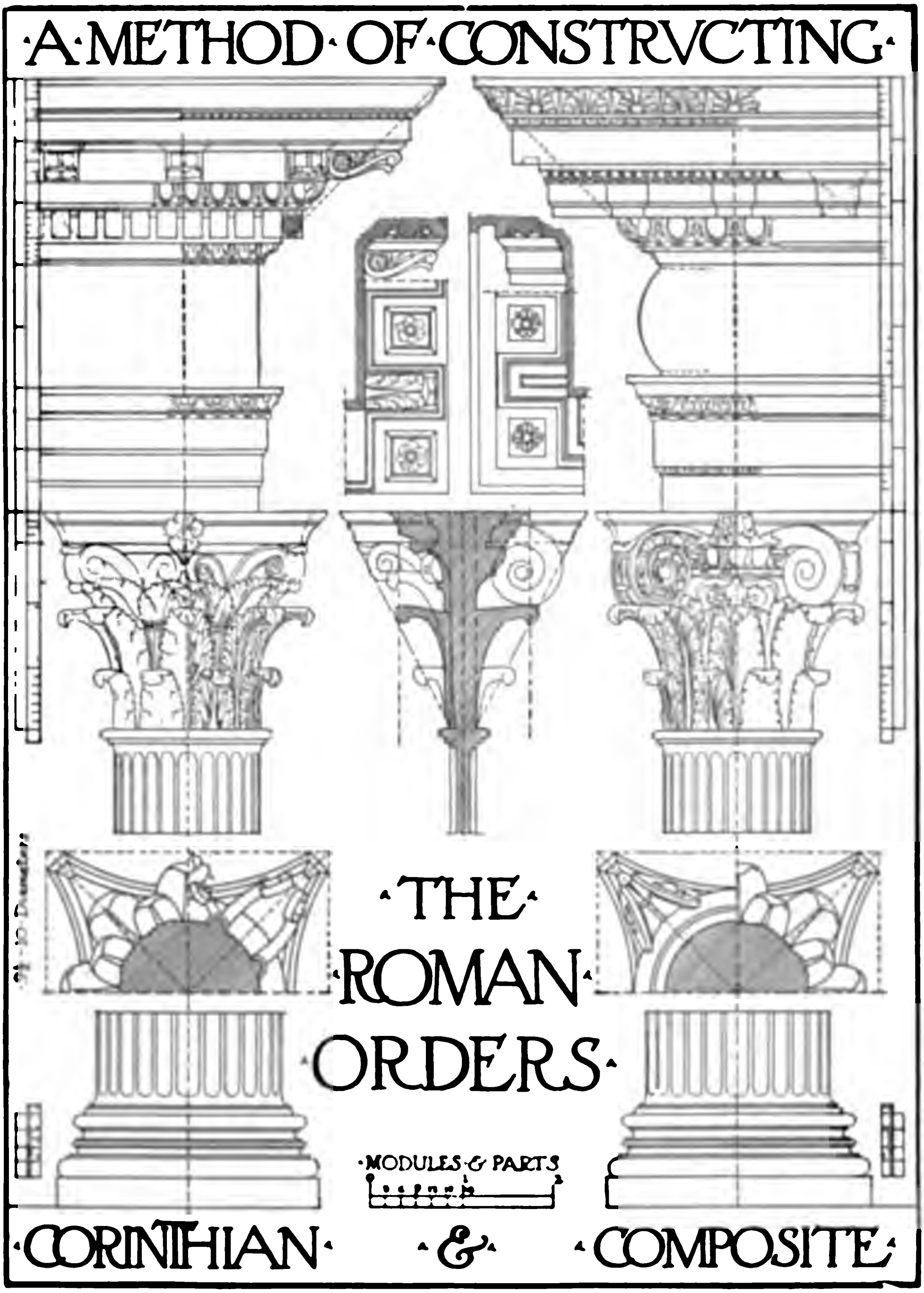
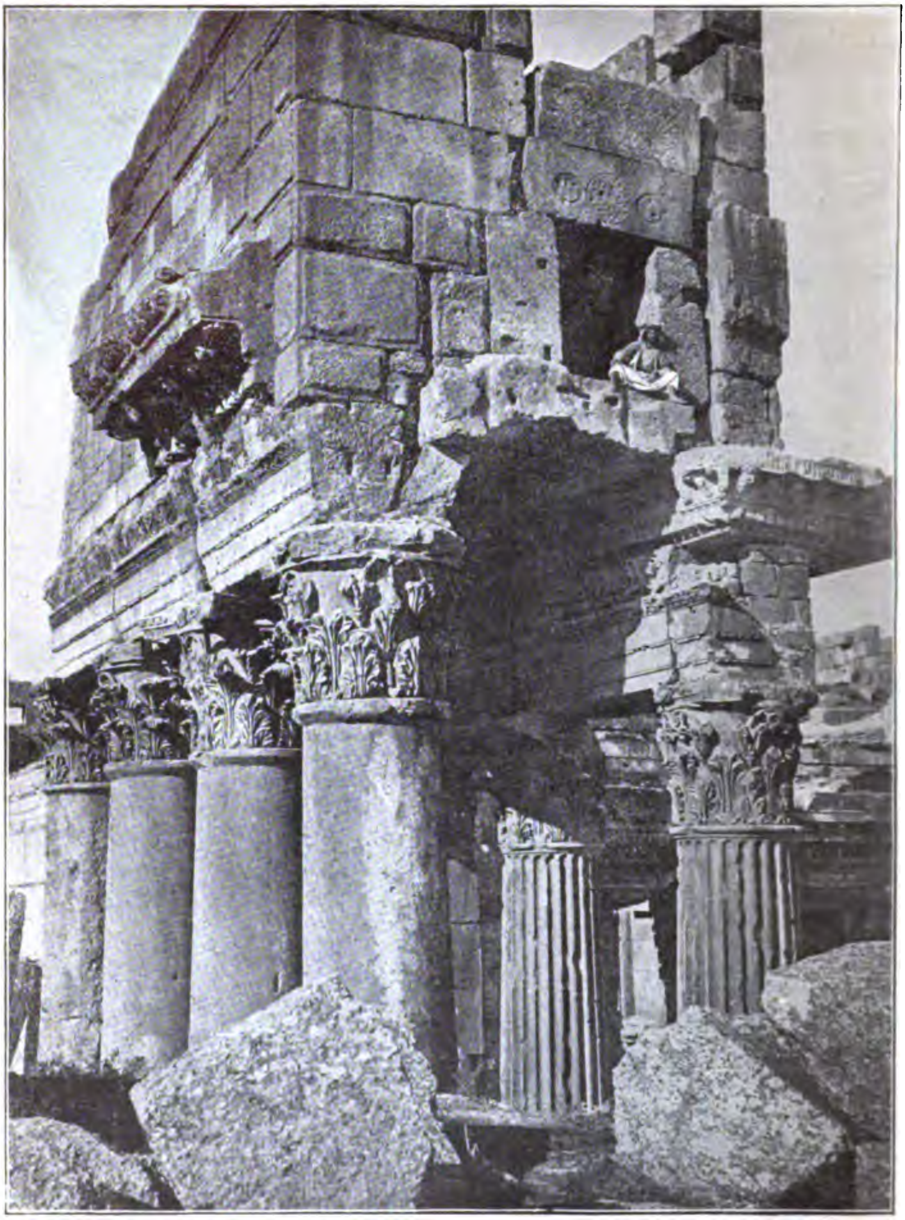


PLATE LV.

(A reproduction at small size of Portfolio Plate LV.)



Corinthian Columns.
From the Temple of Jupiter, Baalbec, Syria.

mutules of the Greeks, but evidently suggested by them, although they incorporate, in part, the leaf and volute treatment of the Corinthian capital. The space between these modillions was filled by elaborately carved panels, and the whole crowned by the usual crowning members of the cornice, again ornamented on every possible surface. The round mouldings of the base of the column and the mouldings of the base and cap of the pedestal in the Corinthian and Composite Roman Orders, are also often heavily enriched by carving.

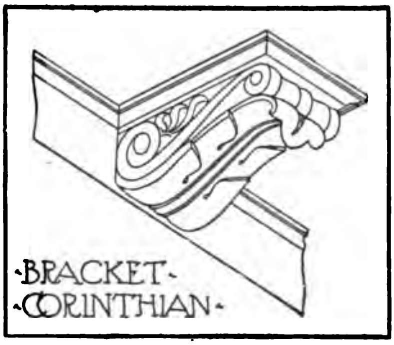


Fig. 133.

The subdivisions and proportions of members composing this entablature and its architrave, frieze, and cornice, are shown in particular in Fig. 132. The lion's head carved on the upper member and coming over the modillion, is sometimes an object of decoration merely, but often serves as a spout for the discharge of rain-water gathered on the roof, and was evidently adapted from a similar ornament employed by the Greeks. These spouts are united by a gutter cut in the upper member of the cornice at the back of its face, in which case the open mouths in the heads are furnished with a piece of tile through which the water from the roof escapes.

THE COMPOSITE ORDER

The Arch of Titus (Fig. 134) contains the earliest known example in Rome of the use of the Composite Order. However, while the first example in Rome, there are still earlier ones existing in cities of Asia Minor. Perhaps the earliest instance of the use of this Order is found in the Pronaos in the Temple of Jupiter at Aizani, where a capital (Fig 135) with a single row of acanthus leaves is used with a volute. This dates from the first century B. C. This capital suggests the possible connection between the ornamented Ionic capital, such as used in the Erechtheum, and the later Roman Corinthian and Composite capitals; showing, as it does, a possible evolution of the leaf treatment of the frieze from these first examples to the more elabo-

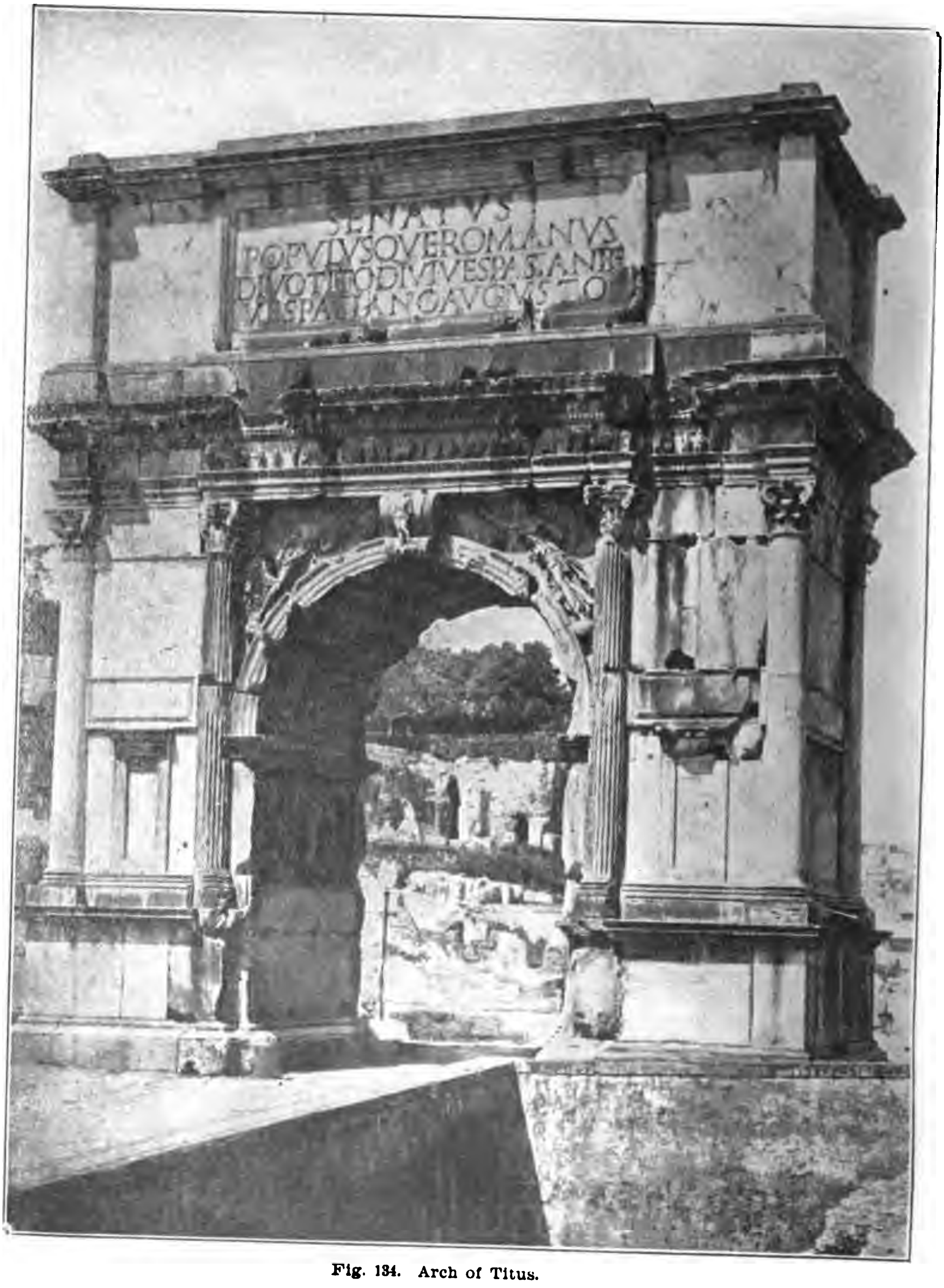
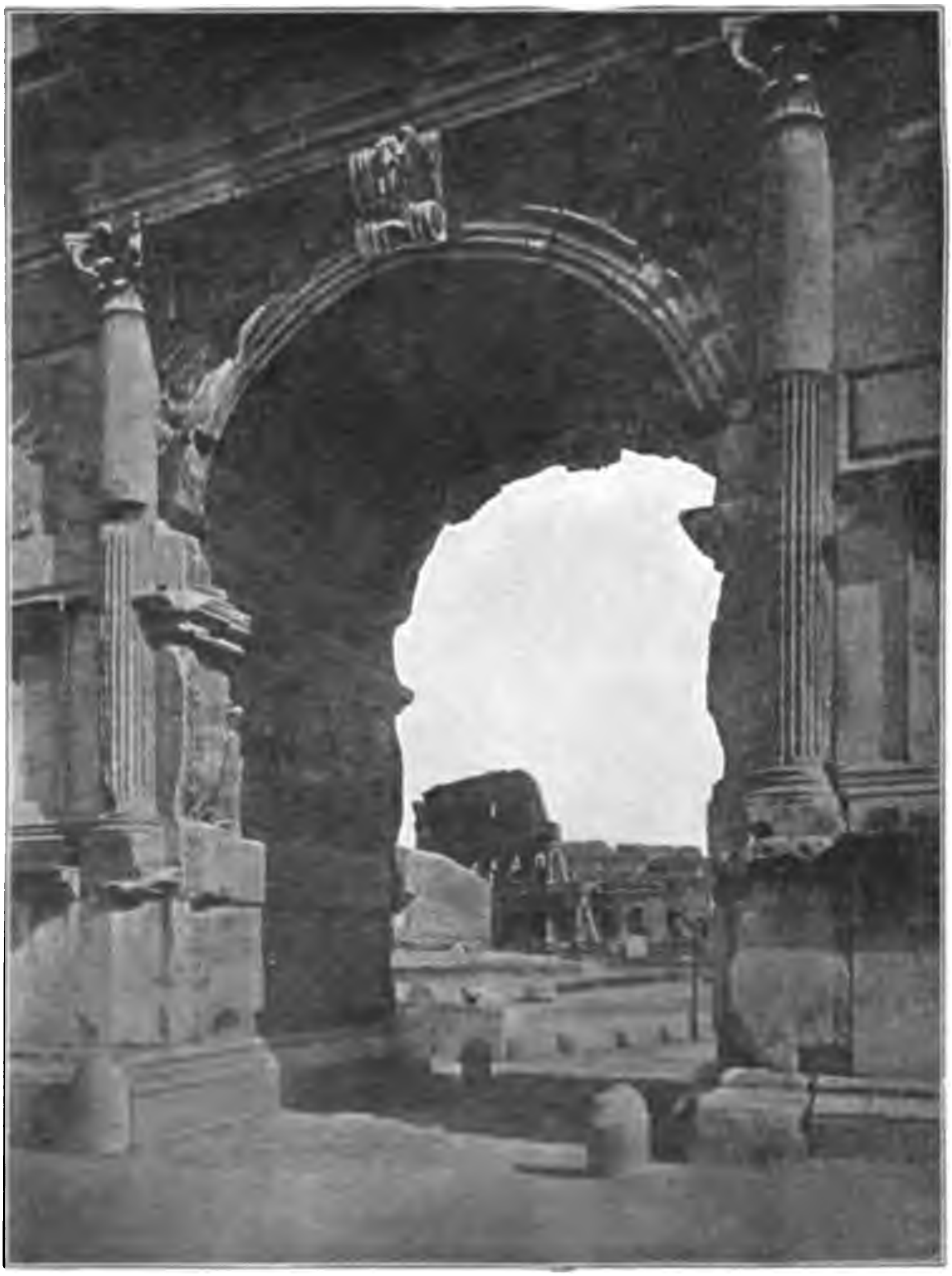


Fig. 134. Arch of Titus.



Arch of Titus, Showing View of Colosseum rate leaf treatment on the face of the bell of the later capital—just such a transition as is shown in this Greek capital from Aizani. So it is possible that the Composite capital is more properly an outgrowth of the richer forms of the Ionic Order, which may have first suggested the use of leafage below the Ionic volutes.

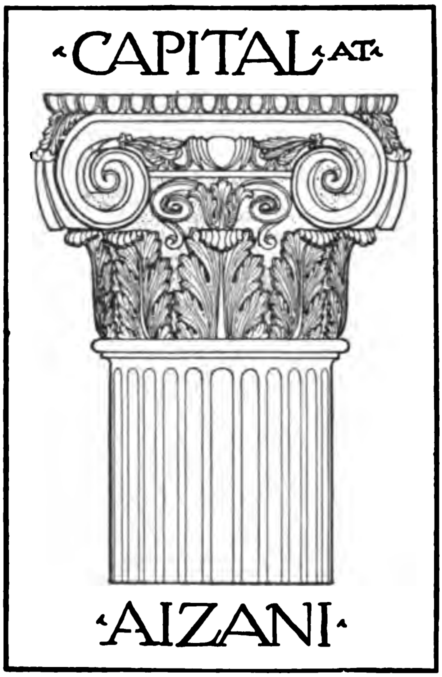


Fig. 135.

But the full development of the Composite form, combining all the richest and most elaborate parts of the former Orders, is undoubtedly due to the Romans. Aside from the fact that all the mouldings of this Order are more elaborately carved even than in the Corinthian buildings, its distinguishing characteristic is again found in the capital, which was an apparent combination of the Corinthian vase-shaped bell along with its ornamental foliage, placed beneath the volute and capital of the Ionic Order. This capital may perhaps be considered as a good instance of that over-elaboration of the Romans which is not consistent with the taste of to-day. This fact makes the Composite Order of little present advantage; and it is necessary to take up and illustrate only a few examples, in order to complete and round out the progress of Roman architecture.

It is in the Forum of Nerva that the first beginnings of the architectural decadence of Rome may be noted. It is here evident that inferior artists are being employed; and the continuous progress of this decline may be noticed in the Composite Order and cornice of the Arch of Septimus Severus, in the Baths of Diocletian, and even in the Corinthian Order employed on the Arch of Constantine.

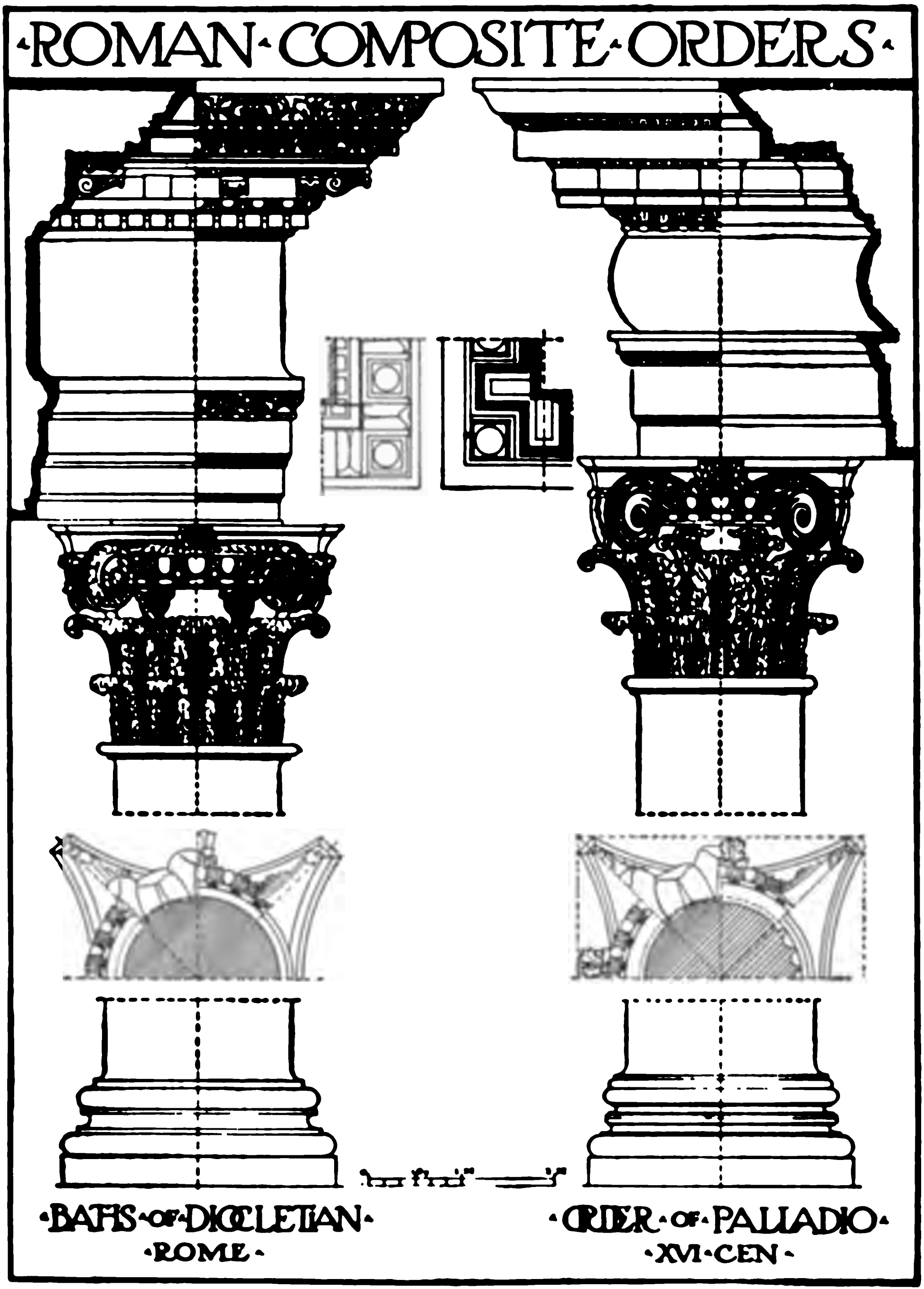


PLATE LVI.
(A reproduction at small size of Portfolio Plate LVI.)

The Composite Order shown in the example from the large hall of the Baths of Diocletian at Rome, indicates what may be considered the ultimate phase of the development of Roman architecture. This Order dates from about 290 A. D.; and, especially in the leaf treatment, the decadence which has overtaken this, along with the other arts, is plainly evidenced.

This Order is shown on the same plate with the Renaissance version of Palladio (Plate LVI), the latter dating between 1518 and 1580 A. D.; while another example very similar to Palladio's form is shown in Plate LV along with a method of construction much the same as that employed with the Corinthian Order drawn out beside it. The simple methods of proportioning the Orders shown in these two examples may be considered sufficiently exact to be used customarily in roughing out the proportions and outlines of these two type forms.

ROMAN GATEWAYS AND TRIUMPHAL ARCHES

Of the famous triumphal arches left by Roman builders, the majority employed the use of the Order in either the Corinthian or Composite forms. These arches were generally of two types. In one—the grander and the more imposing—there was one large central arch for the passage of horses and chariots, with two small arches for foot passengers, one on either side. Of this type, the Arch of Constantine, built 312 A. D. (Fig. 136), is perhaps the best example. It is decorated with separated or detached columns of the Corinthian Order, and is crowned, as was usual in this form of monument, with a heavy Attic story. It must be remembered that these structures customarily carried an elaborate sculptured quadriga of horses and statues, which would do much to break the sky-line and add to the festal effect of the composition.

The other type was of a single arch supported by rather heavy piers, either plain or ornamented. Of this type, perhaps the best example is the Arch of Ancona, dating from about 112 A. D. (Fig. 137), which, being placed at the head of a flight of steps whereby alone it can be approached, is somewhat unique.

Other Roman arches were built in various colonies of the Empire. In many cases they formed the entrance gates to a town or a fortified camp, though frequently they were placed at the intersection of twc

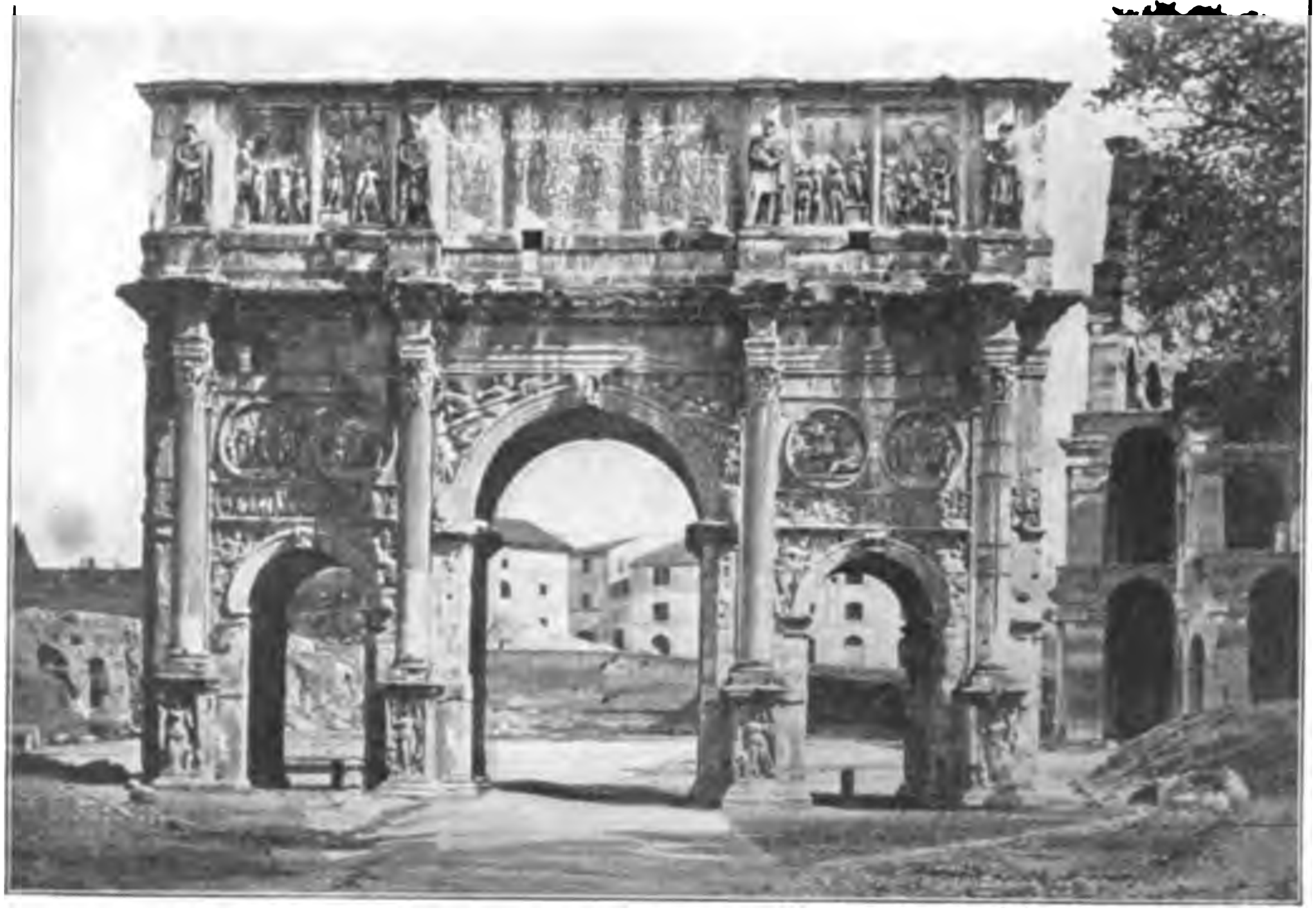


Fig 126 Arch of Constantine, Rome

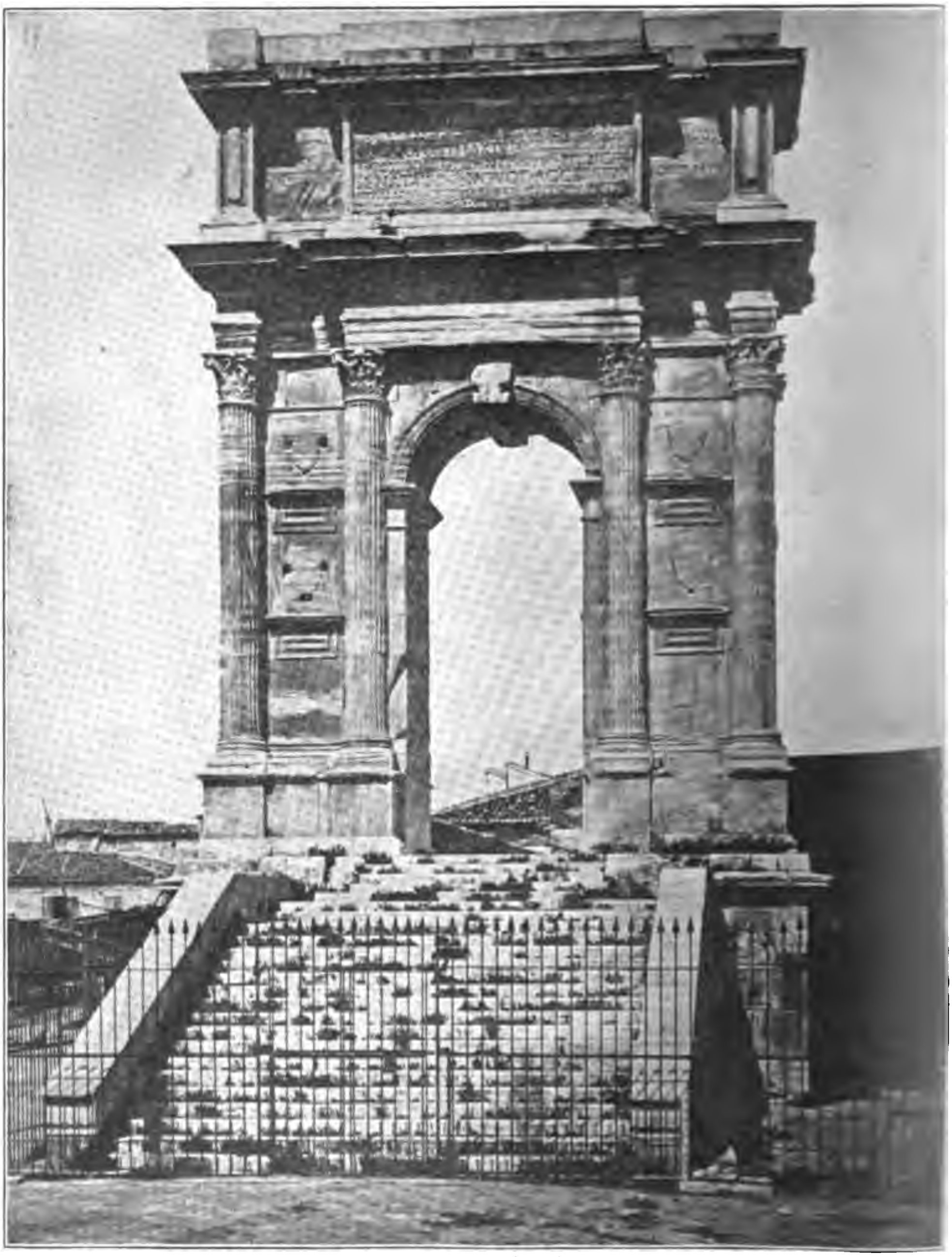


Fig. 137. Arch of Trajan, Ancona.

principal streets, which were probably colonnaded along some part of their length.

Of these long colonnaded streets there are many remains. Probably the most imposing are those at Palmyra, where the enormous size of the columns and the remaining evidences of the great length of these streets make the ruins, even to-day, tremendously impressive.

The great simplicity and good proportions of the Arch of Titus make it the most successful of any of these structures. The columns are attached (those on the Arch of Constantine being separated); and the simplicity of the whole design, with the concentration of interest at the same time upon the carved panels that contrast with the otherwise plain surface of the stone, makes it especially commendable from a modern point of view.

There are two other Roman arches employing the use of this Order that may be specially mentioned—one of the single-arch and one of the triple-arch type. The first of these in point of date is the Arch of Beneventum, 114 A. D., erected in honor of Trajan, which is a most elaborately carved and ornamented example of the single arch, entirely lacking the good proportions of the Arch of Titus.

The Arch of Septimus Severus, 203 A. D., is an example of the triple gateway with detached Composite columns, carrying less architectural carving than the one already mentioned.

ROMAN DOORWAYS

The doorway shown in Fig. 138 was drawn and rendered by Emanuel Brune, at just one-tenth of its original size, from the remains of a doorway in the Doric Temple of Hercules at Cora. The scale in the center of the drawing at the bottom indicates the length of one meter, or approximately 40 inches in our customary method of figuring (39.37 inches, to be exact). The details of a side elevation of the bracket or consol supporting the door-cap, along with a section through this consol and the architrave surrounding the door, are drawn out in Fig. 139. This design shows strongly the influence of Greek precedent which we have already found so much in evidence in all the architecture of Cora and its vicinity, and therefore it may not be considered as so distinctively Roman as the more imposing doorway of the Pantheon, shown in Plate LVIII.

The doorway of the Pantheon is truly Roman in its proportions

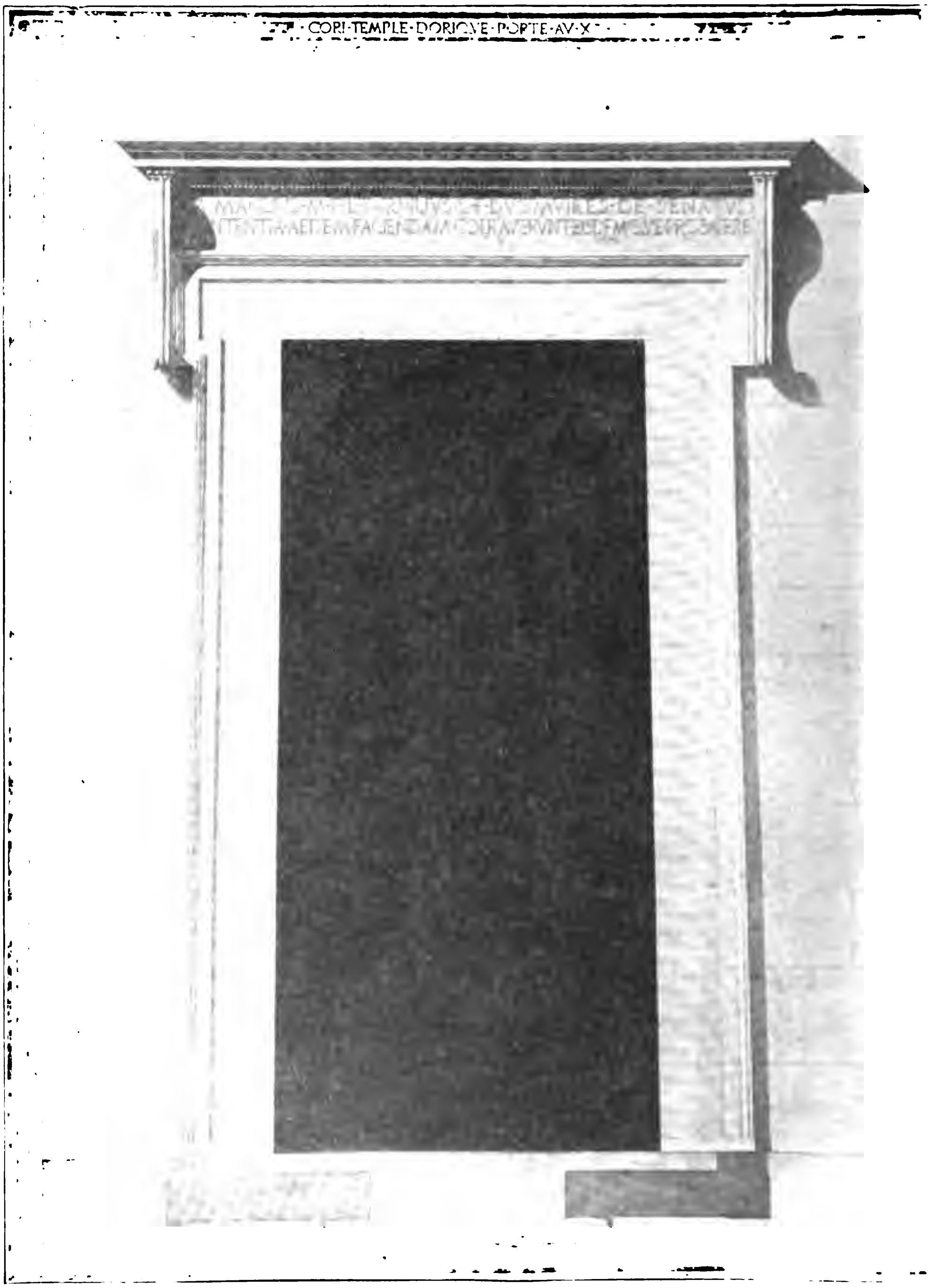


Fig. 128. Doric Doorway from Roman Temple at Cori, Italy.

and treatment, and its richness of ornament. In place of the sloping opening and architrave, narrower at the top than at the bottom and rarely ornamented with carving, we find a large, rectangular opening with perpendicular jambs ornamented on their face by a Classic archivolt with elaborately carved mouldings, and surmounted with a frieze having a plain, curved surface and a cornice of considerable projection. The mouldings are of a good type of Roman section, and the carving is unusually appropriate in character to their outlines. The opening is filled with an elaborate screen of Classic pilasters, grilles, and doors, all of bronze. This metal work probably was originally plated in gold, and is one of the best-preserved specimens of Roman detail that has come down to us. This elaborate doorway lies at the rear of the deep Corinthian portico on the front of the building, and forms the main entrance to the circular rotunda of the interior. See Plate LVIII.

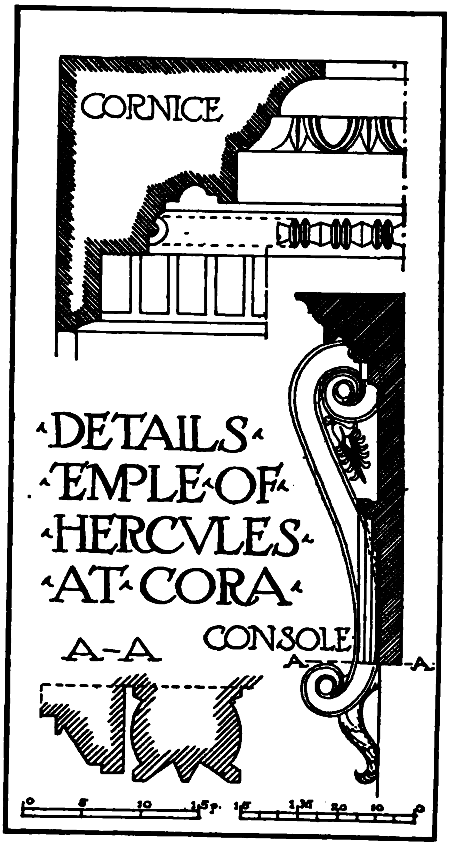


Fig. 139.

ROMAN WINDOWS

Roman window openings are, in earlier buildings, quite closely copied from Greek models, although in work of the true Roman period, such as the Temple of Vesta at Tivoli, the mouldings themselves are Roman in their section outline. The best Classic windows, however, are those designed during the later Renaissance period; and it is better to revert to some one of these types as a precedent for use on any modern Classic structure.

ROMAN MOULDINGS

The mouldings employed by the Romans are generally followed, through the medium of the Renaissance work of Italy and England, in most of the work executed to-day; and these sections are therefore evidently even more important to the student than the Greek mouldings which he has already studied. The architects of the Italian Renaissance selected with almost invariable good taste the best moulding sections employed by the Romans in the Classic examples with which they were familiar; and these same sections were later copied by the architects of England and other countries, until our modern moulding vocabulary is substantially confined for precedents to these profiles.

The various moulding sections may be studied in Fig. 140, as well as in all the other plates, which are carefully detailed for this purpose in order to show the general purpose and use of all the Roman mouldings in common use, so that the variations and refinements in their outlines can be easily apprehended and understood. In studying these drawings, especially those of the Roman Order Plates, it must be remembered that they are intended merely as a type or general form of the many varieties devised by the ancients. The various outlines should be studied in the plates redrawn from original work and in the various works given in the bibliography elsewhere annexed.

In many of the Plates here reproduced, the moulding ornament in the original examples has been omitted in order to show more clearly the moulding outline and section and to convey at the same time the fact that the Order alone may be employed with the minimum amount of ornamentation and yet obtain a very satisfactory result. In other cases, the moulding ornament has been suggested over only a small portion of the drawing, for the same purpose of simplifying the architectural effect as an aid to its readier comprehension. The use of ornamentation, to the extreme degree manifested by the Romans, is evidence of a luxuriance and a lack of refinement on the part of the builders and the nation at large. Useless ornament in any event is employed only for the purpose of rendering upon the beholder an effect of greater costliness; and it is a mooted point whether ornament, as applied by the Romans in elaborate carving on plain surfaces as well as on mouldings, obtains an effect commensurate with its cost.

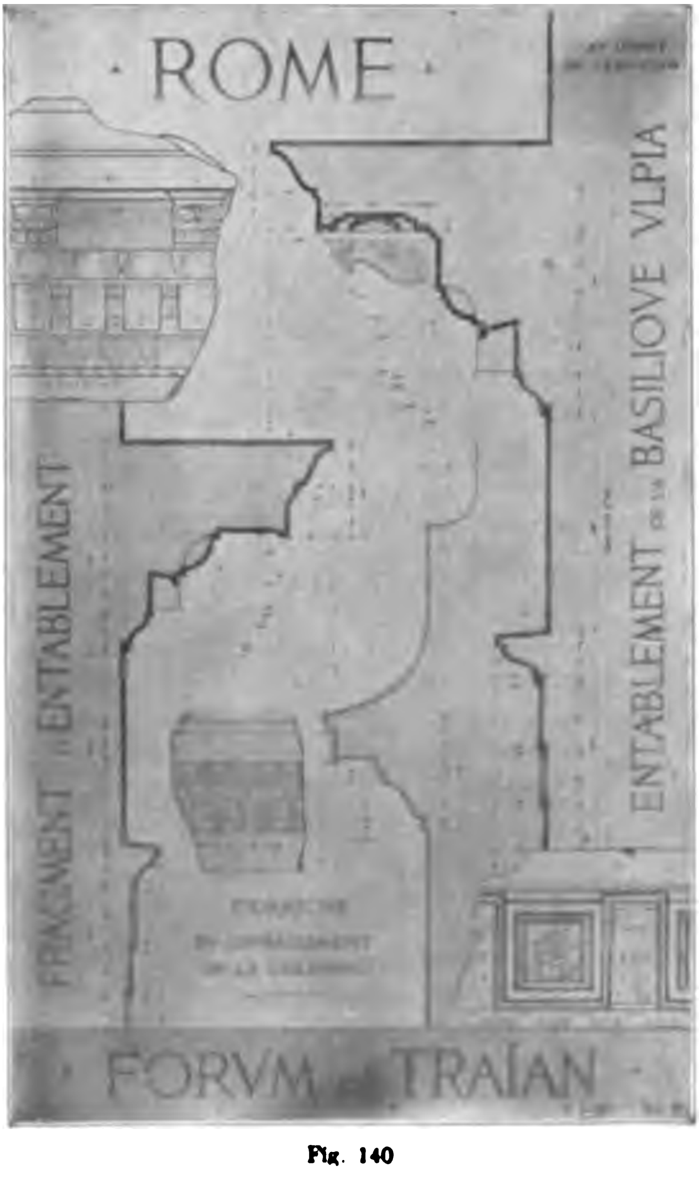

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Fig. 140

ENTASIS OF THE ROMAN COLUMN

The Romans seem to have adopted one general method of diminishing or tapering their columns, evidently based on the Ionic and Corinthian shafts of the Greek Orders. In adapting to their own purposes the Greek entasis, they made no allowance for the fact that their columns were frequently used attached to a curtain wall, but seem to have borrowed the Greek method outright, merely simplifying it for their own readier use.

The general proportions of the bases and columns of the Roman Order may be more carefully studied in Plate LVII, in which three well-known examples of column shafts are drawn out to an equal height.

The Doric shaft is that used in the Villa at Albani near Rome; the Ionic column is taken from the Temple of Fortuna Virilis, about 100 B. C.; and the Corinthian is that used on the Pantheon at Rome, about 120 to 124 A. D., although the column itself is of earlier date. These columns are all shown drawn out to the same height, but have a different base diameter.

The Doric column is about 7¼ diameters high; and it will be noted that if a base were used with this column, it would bring its height up to 7¾ diameters, or substantially the eight diameters that has been adopted in modern usage for the height of the Roman Doric column. The fact that this is an early example may help to account for the omission of the base and for the extra weight of the shaft.

In the Doric Order of the Theater of Marcellus, the columns are 8 diameters high, and at the top taper one-seventh of their lower diameter.

The Ionic column from the Temple of Fortuna Virilis is 8½ diameters high. This column, we must remember, in its original use in this Temple, was shown attached to or decorating the face of a curtain wall. The Ionic column used in the second story of the Theater of Marcellus is 9 diameters high.

The column from the Pantheon is about 9½ diameters high, and has a capital excellently proportioned in relation to the shaft.

The shaft from an interior column of the Pantheon has been carefully measured; and its exact diameter at various points of its height is shown at the left in Fig. 141. Its total height (42 feet 6 inches) is divided into 15 modules and 26 parts, from the top of the necking to the bottom of the shaft, between the points shown on this drawing. Each module or semi-diameter is subdivided into 30 parts, and the diminution of the column is carefully figured in these parts.

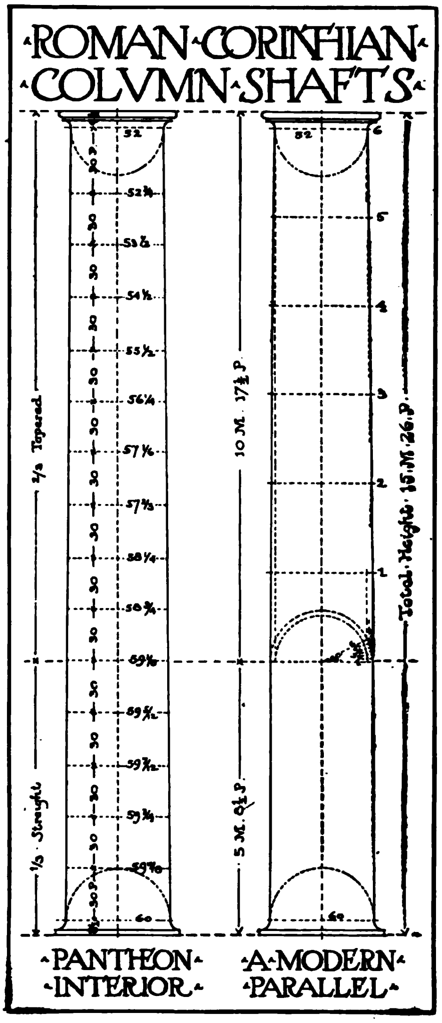

Fig. 141.

At the right of this drawing is shown a shaft displaying a method which almost parallels that employed on the column from the Pantheon; and this method may, for general purposes, be considered to apply to the tapering of all Roman shafts. The only difference between this modern method and the Classic shaft of the Pantheon is found in the lower one-third of the height, which, in the Classic example, instead of being exactly perpendicular, begins to feel—very slightly—the taper of the upper portion of the shaft. This is a refinement that would ordinarily be too subtile to be appreciated or discerned; and in actual practice in a shaft used on the exterior of a building, it is generally considered best to increase slightly the diameter at this point (one-third of the height of the shaft), instead of diminishing it as was done in this instance, when the Order was used in the interior, at a tremendous size, comparatively isolated, and in such a manner that no great distance could ever intervene between the spectator and the object itself. For all ordinary purposes, the method

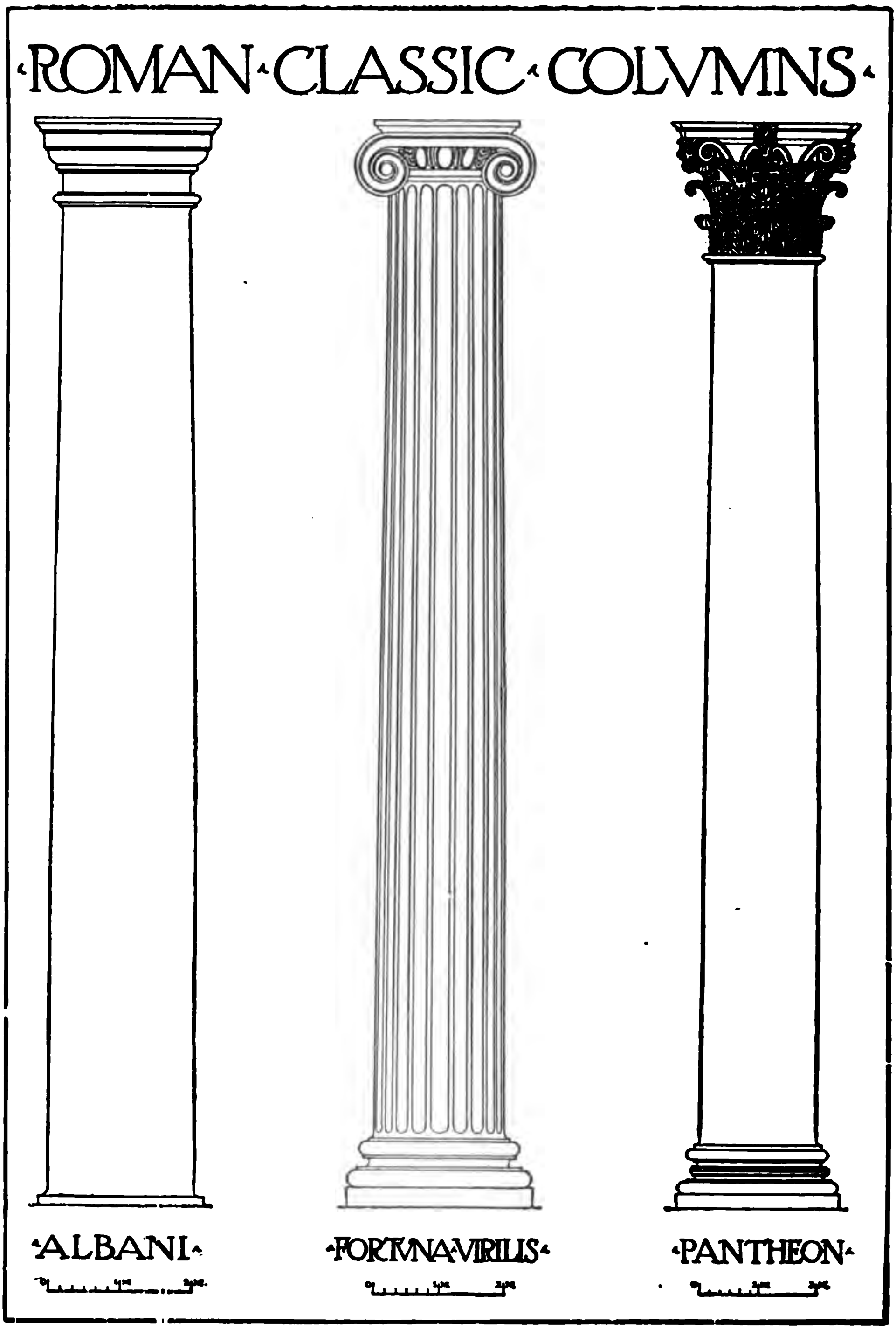

PLATE LVII.

(A reproduction at small size of Portfolio Plate LVII.)

shown at the right of this drawing is sufficiently distinguished and exact.

ROMAN PEDIMENTS

Fig. 142 shows two methods of proportioning a pediment. The upper one is the Renaissance custom that is shown by Serlio; the lower is a method given by the Roman architect and writer, Vitruvius.

Of these two methods the lower is more appropriate to buildings of tremendous size, such as those erected by the Romans; while the Renaissance method of Serlio would be more appropriate for use on modern work. In this illustration it will be seen that the radius of the arc that determines the upper point of the pediment, and therefore its height, is found as indicated, by measuring down on the center line, from a point at the height of the top member of the cornice, a distance equal to one-half the pediment width, and then, with the point thus obtained as a center, striking a circle passing through the two ends of this same member. The intersection of this circle with the perpendicular center line of the pediment, gives the center for the arc that determines the pediment height.

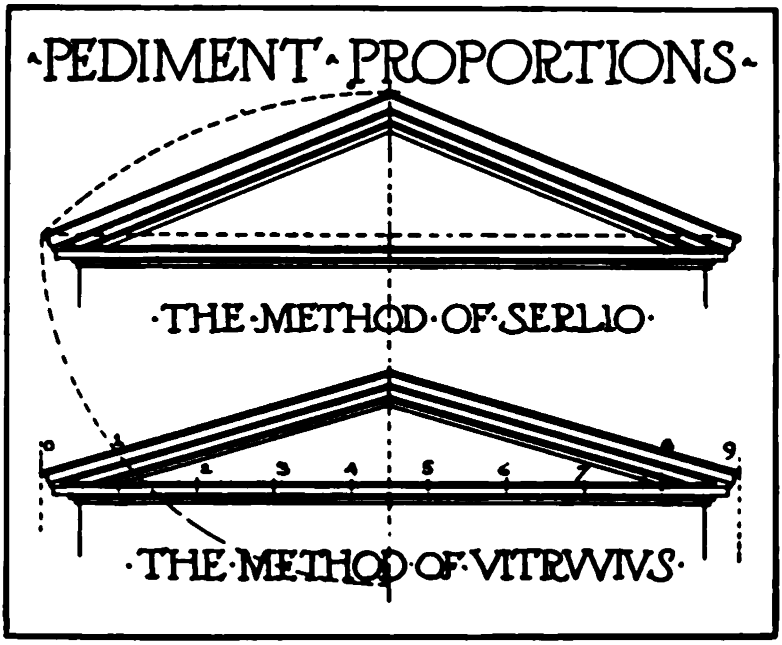

Fig. 142.

In the method of Vitruvius, the entire width across the face of the pediment is divided into nine parts; and the distance of one of these parts is given to the plain face or tympanum of the pediment at the center. By dividing the width into eight instead of nine parts; a tympanum height on the center line would be obtained that would be approximately midway between those shown in these two methods.

ROMAN INTERCOLUMNIATION

The Roman custom in the spacing of columns is of much greater interest to the architect of to-day than the custom of the Greeks, in that the Romans were not held down by the considerations that restricted the Greeks in the use of available lengths of stone which they could quarry or handle for their supporting lintels. Yet the Romans, it must also be remembered, generally used Orders of tremendous size, and employed them on buildings quite different in their whole composition and style from those on which we now employ the column; so, as a general rule, it may be said that we should generally space our columns farther apart than was even the Roman custom.

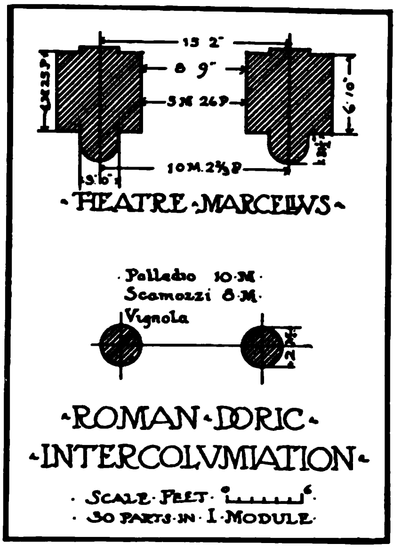

Fig. 143.

In all Doric work, the column must always occur directly under a triglyph; but, instead of the two- or three-triglyph spacing of the Greeks, we find that the Romans frequently spaced their columns with three triglyphs and four metope spaces occurring between the triglyphs that come on the center lines of the column shafts, as in the Theater of Marcellus at Rome; and while the Renaissance authorities united in giving them lesser spaces than this (Fig. 143), modern custom and practice pay but little regard to these precedents. It is now considered proper to space the columns at any distance that the best solution of the problem may require, the only consideration being that they shall not be so far apart as to give the effect of insufficient stability of support. Of course, in spacing columns at greater distances than those given by Vignola and other authorities, it will generally be found advisable to decrease their height slightly in relation to their diameter, in order to give the column a greater effect of solidity and strength.

The Roman use of columns placed against the face of the piers of an arcade, requires a certain relation between the proportions of the column and its spacing and height. These are best studied by noting the spacing of the columns apart in diameters. In the Tabularium, the columns are spaced apart from center to center five diameters. In the Theater of Marcellus and in that of Pompey, this distance was five and one-quarter diameters; and in the Basilica Julia it was five and one-half. The distance from center to center of the columns on the Colosseum is seven and one-half diameters. In this building, all the columns—Doric, Ionic, and Corinthian—are the same diameter at the base. In the Theater of Marcellus, the Doric columns are eight diameters high, and taper at the top to seven-eighths of their lower diameter. The Ionic columns in the second story are nine diameters high, and their lower diameter is the same as the upper diameter of the Doric column below. In the Colosseum, the Doric (or Tuscan) columns on the first story are nine and one-half diameters high, and the Ionic and Corinthian columns are just eight and three-quarters diameters in height. These departures from the ordinary rules are probably accounted for by the fact of the rather special manner in which the columns are here employed. Additional height was necessary, in order to allow room for the vaulting over the corridor inside. On the first story the height is obtained by increasing the length of the column shaft; and in the other stories

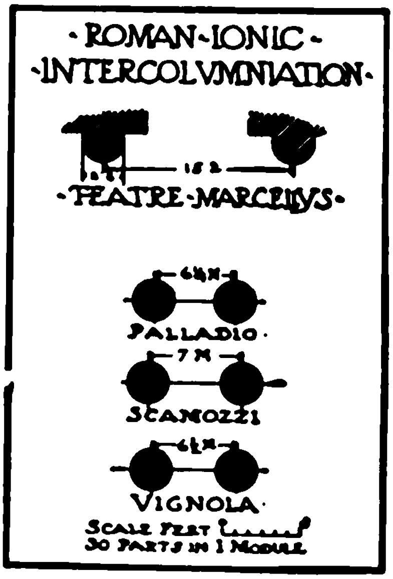

Fig 144.

this additional height is gained in the dado, which breaks out into a sort of pedestal underneath the column shafts. The awkwardness of this solution is displayed by the fact that the architect was driven to place between the faces of his piers an additional dado or solid balustrade in order to act as a parapet for the corridors in the second and third stories—an architectural makeshift that he would undoubtedly have much preferred to omit.

In Fig. 143, the example of Roman Doric intercolumniation from the Theater of Marcellus, where columns are used on the face of an arcade, the columns are shown spaced apart 4½ diameters; while the practice of Palladio, Scamozzi, and Vignola, where the column is used alone, is to space them apart from three to four diameters, or four to five diameters, on centers.

The Ionic intercolumniation shown in Fig. 144, again indicates the arrangement of the Theater of Marcellus, and shows below it the spacing of Palladio, Scamozzi, and Vignola. It must be remembered that in the Theater of Marcellus, the Ionic Order occurs directly over the Doric Order below; and in both instances the column is attached to a wall, and is separated from its neighbor by the arches of the arcade.

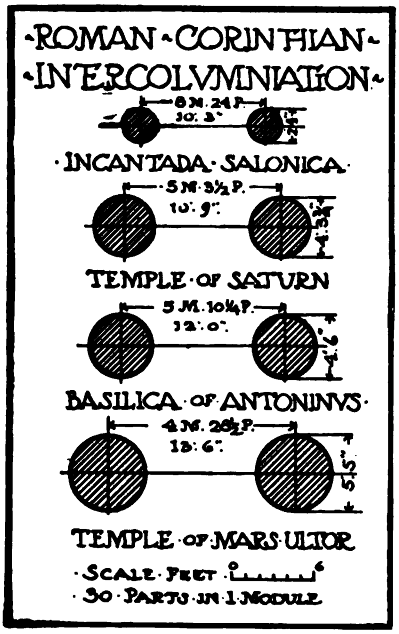

Fig. 145.

Roman Corinthian column spacing is shown in several of the well-known examples in Fig. 145; in addition to which the dimensions and proportions of the columns on some of the principal temples are as follows:

In the Temple of Vesta at Tivoli, where the columns are 18 feet 5 inches high, and are raised on a high basement, they are 9¼ diame-

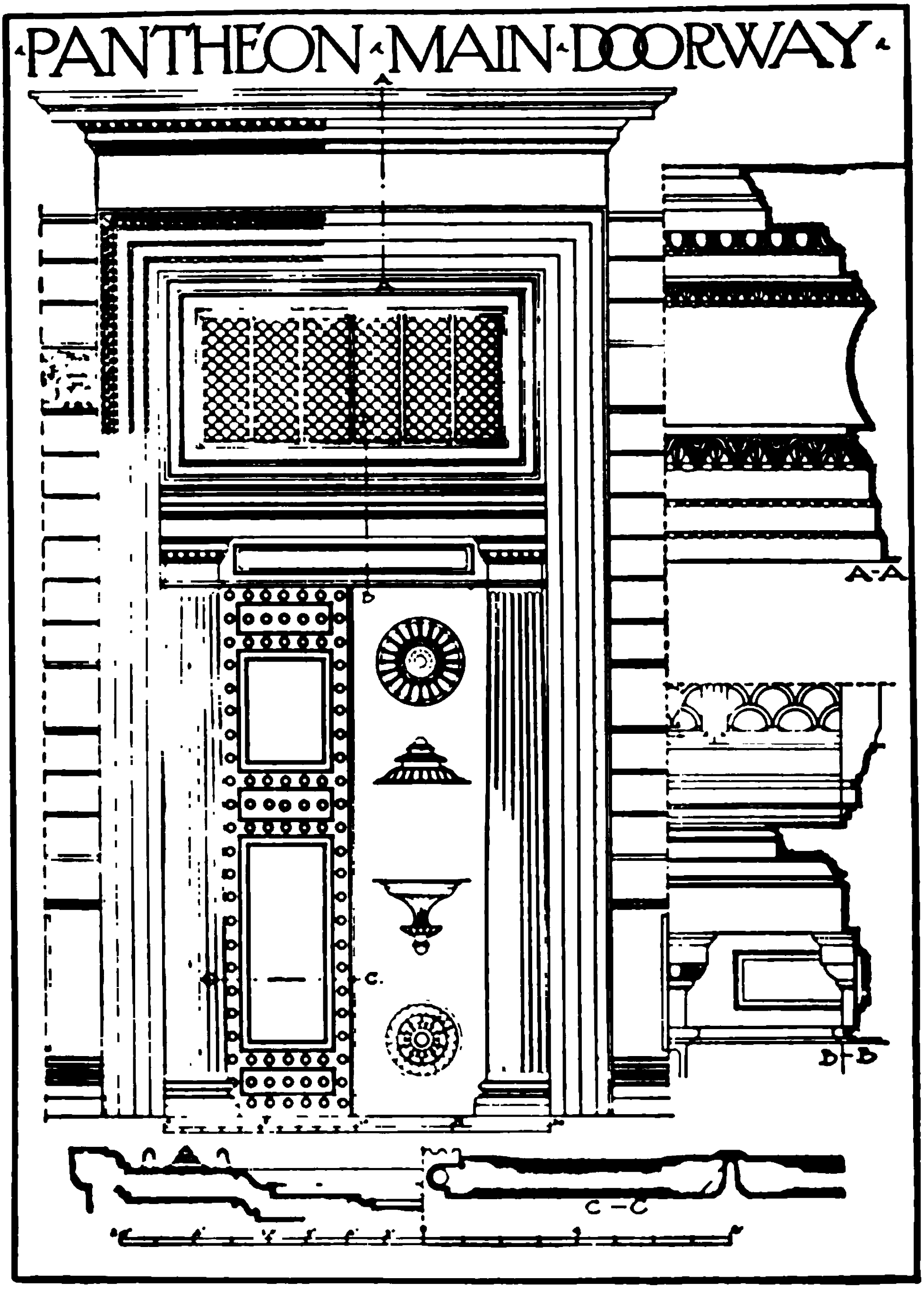

PLATE LVIII.

(A reproduction at small size of Portfolio Plate LVIII.)

ters high, the capital being just one diameter. In this instance it was the evident intention of the designer to obtain a stumpy effect.

In the Temple at Nimes the columns are 30 feet high, with a diameter of 6 feet 9 inches, and the intercolumniation is two diameters. The columns of the Portico of the Pantheon are 45 feet 3 inches or 9¼ diameters high, and the intercolumniation is 2⅐ diameters.

In the Temple of Vesta at Rome, the columns are 48 feet 3 inches high or 10½ diameters, and the intercolumniation is 1½ diameters. In this temple the tall and slender column shafts are accounted for by the fact that the building was crowded in and surrounded by higher structures, and this environment made the extra column height essential in order to obtain the necessary dignity.

In the Temple of Mars Ultor, the columns are 57 feet 9 inches or 10 diameters high, and the intercolumniation is 1⅓ diameters.

The columns of the Frontispiece of Nero are 58 feet high, as are also the columns of the Temple of Jupiter Olympus.

ROMAN PILASTERS

The use of pilasters by the Romans was very different from the Greek custom, and the pilaster is given a much more important place in their architectural development.

The Roman pilaster in the later periods is practically the same as the column in its treatment of the capital and base, and therefore quite different from the Greek anta. The question of diminishing the shaft at the top is one that seems to have been left largely to the discretion of the designer, and no general rule can be given that will apply invariably. In some instances the procedure follows the same method as used in the column itself, and at other times the shaft is carried up in a plumb, perpendicular line from the base. In general, the same considerations that have been given in the discussion of the pilaster treatment in Part I may be either applied exactly as there outlined, or may be varied by the designer at his own discretion.

In most Classic instances the pilaster was treated exactly the same as the column. It was given the same cap and base; the shaft, of course, being plain and square in plan. As regards the pilaster dimension at the neck and base, there is considerable difference of custom among the oldest examples. In Roman practice the pilaster is sometimes treated with sides tapering in the same manner as the sides of the column and exactly to agree with it. At one time, the whole shaft will be treated with the exact diminution given to the accompanying column; at others, the pilaster is of the same width at the neck as at the base, the size being determined by the average between the diameter dimensions of the column at neck and base, approaching, if anything, more nearly the larger than the smaller diameter. In other cases —as, for example, where pilasters alone are used—they are generally made straight and of equal width throughout their entire height; but even then they are sometimes given an entasis the same as the column. The shafts of the pilaster are generally treated to agree with the columns with which they are used. They may be plain, fluted, or—especially in Renaissance work—paneled.

The projection of the pilasters from the wall was generally about from one-quarter to one-half their width; but sometimes a greater depth was required, in order that they should remain free from projecting belt courses or horizontal cornices that stopped against them. If given greater depth than this, a pilaster is apt to compare unfavorably with the column itself, and to give a clumsy, stiff effect, while causing the column by contrast to appear thinner. The pilaster should always be used against the wall behind a column, in order to receive the beam or entablature which it carries. Occasionally a round half-column or three-fourths column may be used for the same purpose in place of the pilaster, but this use is comparatively rare in old work. It has the obvious disadvantage that if an exact half-column is used, it appears to the eye of less size than the entire columns which stand free from their surroundings, while any horizontal courses cutting into it have a tendency to divide or cut off its apparent height and diameter.

Possibly an intimate and thorough acquaintance with a large variety of moulding sections, together with a nice appreciation of their proportions and use, is the most important result for which the student can hope from the study of the Orders. Certainly it is the most tangible return, the only one that can be considered as of greater importance being an unconscious development of the sense of proportion which cannot fail to result from an earnest study of the old examples. An intelligent appreciation of the reasons governing the various proportions of columns and the different sections of mouldings, will result in an equally subtile sense of proportion in regard to the outlines and the composition of the various parts of a building or group of buildings. This sense may also be developed by a study of the history of the various races and builders, and by a knowledge of the purpose for which the buildings were intended, of their comparative height and surroundings, of the location of the Order or mouldings on the building and the purposes they were intended to fulfill. If, in addition, the student is able, from the contrast between the effect of any executed moulding section as given to his eye and its actual contour in the section outline, to deduce the relation that the one bears to the other, he will have gone far on the road toward a mastery of architecture.

EXAMINATION PLATES

In addition to the following Examination Plates, the student is expected to make such sketches or drawings of the different parts of the Order, from the descriptions and references in the text, as will enable him to understand thoroughly the different parts and their general forms and proportions.

The following plates are to be drawn out to the required sizes, as indicated in the following section. The plates should be carefully and thoroughly drawn out in pencil before attempting to ink them in, with the exception of the three studies mentioned in problem 10, which may be submitted in pencil for correction, the student finishing them in ink for his own possession at any time after. All of the large plates are to be drawn on a half-sheet of Strathmore smooth-finish or Whatman's hot-pressed drawing paper, with the border line laid out to the size given, 12 by 16½ inches; and the paper should be trimmed with a half-inch border outside of this line, making the paper size of the finished plate 13 by 17½ inches.

The measurement figures given on the various plates may be omitted from the drawings made by the student.

The titles of the plates are, generally speaking, to be lettered in the same fashion as are the principal drawings illustrating the foregoing section. The student should first be careful to place pencil guide-lines at the top and bottom of his letters, for both capitals and small letters.

The date, the student's name and address, and the plate number should be lettered on each plate in one-line letters, such as are used in the title of Fig. 47.

PLATE A

The student is to draw out to the size of 12 by 16½ inches a plate showing the Roman Doric Order. This plate should be arranged in the same manner as Plates VII and VIII (Part I), and should show a Classic Roman Doric Order complete in all its parts. The student may use either the Mutular or Denticular style, as he may elect.

PLATE B

The student should draw out the complete Roman Doric column after the manner shown in Plate LVII, but employing the method of determining the entasis given at the right in Fig. 141, and employing the capital and base shown in Plate VIII (Part I). The height of the column should be eight diameters; and the fluting, which should be shown in the previous problem plate, may here be omitted. This column should be drawn on paper of the same height as the other plates, but of much narrower width.

PLATE C

The student is to draw a bay of an arcade, employing the Roman Doric Order, on a plate of the size of 12 by 16½ inches. He should refer to Figs. 98 and 99 for the proportions of this arcade, but should so arrange his composition, that, without losing the proportions of the arch opening or the relations of the column diameter to its height and to the entablature, he may yet omit the plain section of the wall occurring between the Order entablature and the archivolt, marked A in Fig. 99. In his drawings, the center of the arch should be the center line of his paper, which will enable him to include the two columns and their piers. He may utilize any one of the Doric Orders shown in the illustrations of this part.

PLATE D

The student is to draw out to the size of 12 by 16½ inches a plate showing the Roman Ionic Order. This plate should be arranged in the same manner as Plate XIV (Part I), but should illustrate the Order shown in Plate XIII (Part I), and should show a classic Roman Ionic Order complete in all its parts.

PLATE E

The student is to draw out the Roman Ionic column from the Temple of Fortuna Virilis, complete, as shown in Plate LVII, establishing his entasis after the method shown in Fig. 141, as before. This column should be fluted; and the same requirements as to height, size of paper, etc., that applied to Plate B, will also hold true of this drawing.

PLATE F

The student is to draw out to the size of 12 by 16½ inches a plate showing the Roman Corinthian Order. This plate should be similar in arrangement to Plate XXI (Part I), and should show a Classic Roman Corinthian Order complete in all its parts.

The student should employ for this plate the Classic Roman Order from the exterior of the Pantheon shown in Plate LIII.

PLATE G

The student is to draw out an entire column and shaft of the Roman Corinthian Order, employing the method of determining the entasis shown in Fig. 141. He is to take the column and shaft from the Temple of Antoninus and Faustina illustrated in Plate LIV.

PLATE H

The student is to draw out at the size of 12 by 16½ inches the main doorway of the Pantheon, shown in Plate LVIII. He may omit the metal doors, pilasters, and transom work shown on this plate, in order to increase the size of his doorway. The section through the entablature may then be shown inside of the door opening.

PLATE J

The student is to draw inside the border outlines of 12 by 16½ inches the following examples of Roman Classic ornament:

In the upper left-hand quarter of his paper, he is to draw the entablature from the Temple of Antoninus and Faustina; and in the upper right-hand corner, the entablature from the Temple of the Sun, both shown in Plate LIV. In the lower left-hand corner, he is to draw the entablature from the Temple of Vesta at Tivoli, and in the lower right-hand corner, the Corinthian capital and base from the same temple shown in the same drawing (Fig. 130).

The three entablatures are to be all of the same height; and the capital and base, from the column of the Temple of Vesta, of a size best adapted to fill the remaining space.

PLATE K

This problem is to consist of three drawings; but they are not required to be elaborately finished. In Plate LI is shown a method of constructing a Roman Ionic Order; and in Plate LV is shown a similar method of constructing the Corinthian and Composite Orders. The student is to make three drawings, each with a border outline size of 12 by 16½ inches, employing this method of construction and carrying it to a point that will sufficiently show his acquaintance with its employment. The carving, it is necessary only to block in; and these three plates may be left in pencil instead of being inked in.

The object of this examination problem is to familiarize the student with these methods of proportioning, which are simpler and more readily comprehended and remembered than the more elaborate "modules" and "parts" systems.

FREEHAND EXAMINATION SKETCHES

The student is required to draw freehand the following sketches, utilizing the information he has obtained from the Plates included in this Instruction Paper, and is to be particular to render the drawings so as to indicate a clear understanding of their proportions and of the character of the carving and ornament.

These sketches are to be laid out in perspective as described in the Instruction Paper on that subject; and are to appear when complete, as the model given in Fig. 110. A quarter-sheet of the same paper used for the other examination plates may be employed for these sketches.

These perspective studies are to be made by the student at the time when he is studying the separate Orders; and they should all three be sent to the School together, when the last one is completed.

PLATE L

A sketch of the Roman Doric Order shown in perspective similar to Fig. 110. The outline size is to be 8½ by 12 inches.

PLATE M

A sketch, in perspective, of the Roman Ionic Order, using any one of the styles shown in the foregoing section, and arranged in the same manner and at the same size as in the preceding Plate (L), using Fig. 110 as a model.

PLATE N

A sketch of a Roman Corinthian Order, employing any of the types shown and arranged in the same manner and at the same size as Plates L and M, above.

GLOSSARY

A GLOSSARY OF ARCHITECTURAL TERMS AND CLASSICAL PROPER NAMES

In the scheme of pronunciation, all long vowels are marked; those having no quantity indicated are short.

A

Abacus (ab'a-kus). The square plinth or tablet forming the upper or crowning member of the capital of a column or pillar, supporting the Classical entablature. (See Fig. 61.)

Abutment (a-but'ment). The solid masonry construction supporting each side of an arch, and calculated to resist its thrust. A pier or buttress built against a wall to receive or transmit a thrust. (See Plate XXIX.)

Acanthus (a-kan'thus). A spiny plant whose leaf is used—in conventionalized form—as a decoration for capitals, brackets, etc. (See Fig. 69.)

Acropolis (a-krop'o-lis). The upper or higher part of a Grecian city; hence, a citadel or castle; generally used with special reference to the Acropolis at Athens, crowned with the Parthenon. (See Frontispiece illustration.)

Acroter (ak'rō-ter), **Acroterium** (ak-rō-tē'ri-um); plural, **Acroteria** (ak-rō-tē'ri-a). A small pedestal placed on the apex or at the basal angle of a pediment to support a statue or other ornament; a statue or ornament placed on such a pedestal. (See Fig. 45.)

Ægean (ē-jē'an). A "sea" or gulf of the Mediterranean, lying east of Greece.

Ægina (ē-jī'na). The capital city of an island of the same name in the Ægean Sea, containing a famous Greek Doric temple of Pallas Athene or Minerva, the goddess of wisdom and war.

Agrigentum (ag-ri-jen'tum). A city on the south coast of Sicily (the modern Girgenti), noted for its Doric temple of Zeus and many other Greek structures dating from before the Carthaginian conquest in the 5th century B. C.

Agrippa (a-grip'pa). A Roman general, born B. C. 63, the leading statesman of the reign of Augustus. The present Pantheon was erected on the site and—in part—from the materials of an earlier temple built by him, dedicated in 27 B. C.

Aizani (ī-zā'nī). A small town of Phrygia, Asia Minor, containing some early remains of Greek workmanship. (See Fig. 135.)

Akroter (ak'rō-ter). Same as Acroter.

Albani (al-bā'nī). A villa near Rome containing an unusual example of the Roman Doric Order. (See Fig. 117.)

Alberti (al-ber'tē), **Leone Battista**. A Renaissance architect and writer on architecture.

GLOSSARY

Ambulatory (am'bu-lā-to-ri). A covered passage or walk, generally located just within the main walls of a building; a passage around the choir in the apse or chancel of a cathedral, or between the columns and walls of a circular building. (See Fig. 78.)

Amphiprostyle (am-phip'rō-stīl). Provided with a columned portico at each end. (See Figs. 33 and 34.)

Amphitheatre (am-fi-thē'a-ter). A structure whose plan is laid out on a system of curves around a central pit or arena, and generally intended for spectacular purposes. (See Fig. 112.)

Ancon (an'kon). A boss or projection left on a block of masonry to serve as a console or small bracket. The vertical corbel supporting the cornice in a Roman doorway. (See Figs. 138 and 139.)

Ancona (an-cō'na). A town on the Adriatic Sea, containing a Roman single arch in a comparatively good state of preservation, dating from about 112 A. D., erected in honor of Trajan. This arch is unique from the fact that it can be approached only by ascending a flight of steps. (See Fig. 137.)

Andron (an'dron). An open space, court, or passage in a Greek building; also the portion of a house especially appropriated for males.

Andronicus Cyrrhestes (an-dron'i-kus sir-rhes'tēz). A Syrian mathematician, best known as the builder of the so-called Tower of the Winds in Athens. (See Fig. 72.)

Annulet (an'nū-let). A small fillet, circular in plan and usually square or angular in section, under the echinus of the Doric capital. It is also sometimes used at the base of the column and in connection with other mouldings. (See Figs. 41-44; and 1, 2, 3, 4, 5, and 6, Plate XXXIX.)

Anta (an'ta). Plural, **antæ**. Greek pilasters, placed at the ends of the side walls of a temple, forming the corners, whose bases, capitals and proportions differ from the accompanying columns, when columns are placed between them. (See D, Fig. 2; also Fig. 91.) These columns are said to be *in antis*—*i. e.*, between antæ. (See Plate XXXV, Temple of Diana Propylæa.)

Antefix (an'tē-fiks). Plural, **antefixes**. Ornamental blocks placed at regular intervals on the eaves or cornices of Classic buildings to cover the termination of the tiling ridges. (See Plates XXXVI and L.)

Anthemion (an-thē'mi-on). Sometimes called "honeysuckle." A floral ornament employed—generally with the acroteria—to decorate Classic friezes and capital neckings. (See Plate XL and Fig. 92.)

Antoninus (an-to-nī'nus). A Roman emperor, A. D. 138-161. (See Plate LIV.)

Apollo Didymæus (a-pol'lō did-i-mē'us). One of the many name sunder which the Olympian god Apollo was known. In his honor was built a temple near Miletus in Asia Minor, a splendid example of the Ionic Order. (See Fig. 71.)

Apophyge (a-pof'i-jē). The cavetto or concave sweep at the top and bottom of some column shafts, leading to the capital and base; the hollow or scotia beneath the echinus of the earliest Doric capitals, leading to the shaft. (See Figs. 122, 126, and 128.)

Apse (aps). The curved or angular and vaulted end of a church, back of the altar.

Aqueduct (ak'wē-dukt). An engineering work employed to carry a conduit for water from one distant point to another. In crossing a valley, it generally consists of a series of arches resting on piers. (See Fig. 101.)

Aræostyle (a-rē'ō-stīl). An arrangement of columns having four diameter spaces, or more than three, between their shafts, center to center. (See Fig. 19.)

Arcade (ar-kād'). A continuous series of arches resting either on piers or columns. (See Figs. 21 and 101.)

Arch (arch). A member, usually carved, spanning an opening in a wall or colonnade, and supporting the wall or other members above the opening. (See Figs. 4 and 134). In the "flat arch," the separate parts of which it is composed are so shaped as to support one another without rising to a curve.

Architrave (ar'ki-trāv). (*a*) The lower division of a Classic entablature; that member which rests immediately upon the column capital and supports those portions of the structure which are above it. (See Fig. 3.) (*b*) The ornamental moulding running around the extrados of an arch. Also called Archivolt. (See Fig. 4.) (*c*) Sometimes, less properly, the moulded enrichments on the face of the jambs and lintels of a door, window, or other opening. Also called Antepagment. (See Figs. 84 and 95.)

Archivolt (ar'ki-volt). The series of mouldings on the face of an arch following the contour of the extrados, and ending upon the imposts. (See Fig. 4.)

Archway (arch'wā). A way or passage under an arch. (See Fig. 4.)

Arles (arl). A city of southern France, celebrated for its many Roman remains.

Arris (ar'is). The projecting angle or edge formed by the meeting of two su faces; particularly the edges of mouldings, and the sharp edges betwee adjacent channels in the Doric column. (See B, C, and D, Fig. 49.)

Artemis (ar'te-mis). Greek name of the Roman goddess Diana. Daughter of Zeus and Latona, and twin sister of Apollo. Born on the island of Delos. One of the earliest instances of the use of the Greek Ionic Order seems to have been on a temple at Ephesus dedicated to this goddess.

Assisi (as-sē'sē). A city in central Italy containing several Roman ruins, including a Corinthian temple to Minerva belonging to the Augustan era.

Astragal (as'tra-gal). A small, convex moulding, generally ornamented or cut into the form of a string of beads. Used in Classic architecture, especially in connection with the egg-and-dart moulding, and between the faces of the different projections of the Ionic and Corinthian architraves. (See A and G, Plate XL, and Plate XLIII.)

Astylar (a-stī'lar). A Classic style of building without columns, substituting in their place a plain wall.

Atlantes (at-lan'tēz). Figures or partial figures of men used in the place of columns or pilasters to support an entablature; also called telamones. When female figures are used, they are called caryatids or caryatides.

Attic (at'ik). The upper part of a building. A story appearing in the façade of a building above the cornice and entablature. Sometimes applied to that portion of a triumphal archway above the cornice and below the crowning member, as in the Arch of Trajan at Ancona. (See Fig. 137.)

Attic (at'ik). Athenian.

Attic Base A base, properly used with the Ionic order, consisting of an upper torus, a scotia, and a lower torus, separated by fillets. (See A, Fig. 57.)

Auditorium (au-di-tō' ri-um). That portion of a public hall of assemblage intended for spectators.

Augustus (au-gus'tus). One of the Roman emperors, B. C. 27 to A. D. 14. During his reign were built the Pantheon at Rome and other well-known architectural structures, including two temples of Vesta, one in the Roman Forum and one at Tivoli.

Aurelian (au-rē'li-an). One of the Roman emperors, 270-275 A. D. He built the Temple of the Sun on the Quirinal Hill.

Axis (ak'sis). The center line of an object or structure as seen in plan or in elevation; a straight line dividing a body into two equal parts. (See Figs. 65 and 66.)

B

Balustrade (bal-us-trād'). A railing or wall with upper rail or coping supported by balusters. (See C, Plate XXXIV.)

Band (band). A flat member or moulding of small projection. (See Fig. 61.)

Base (bās). The part of a column between the upper part of the pedestal and the bottom of the shaft; or, if there is no pedestal, between the bottom of the column-shaft and the plinth; the lower projecting part of the wall of a room, consisting of a plinth and its mouldings. (See Figs. 3 and 4; also Figs. 57, 61, 111, 122, and 126.)

Basilica (ba-sil'i-ka). A Roman Hall of Justice, whose general plan was afterwards adopted as the form of the early Christian church.

Basilica Julia (ba-sil'i-ka joo'li-a). The temple in the center of the Forum Julium, the first of the smaller Roman Forums, constructed by Julius Cæsar in honor of his wife. (See Fig. 140.)

Bassæ (bas'sē). A town in Arcadia, Greece, near Phigalia, noted for the Doric and Ionic Temple of Apollo, which—next to the Theseum at Athens—is the most completely preserved specimen of Classic Greek art.

Baton (ba'ton). The stem or wand supporting the cauliculi (small scrolls and leaves) of the Corinthian capital. (See Plate XVI)

Batter (bat'ter). A backward or receding slope in the face of a wall as it rises.

Bead (bēd). A small, half-round moulding. (See Fig. 5.)

Bead-and-Reel (bēd-and-rēl). A much-used decorative moulding consisting of a small sphere and one or two circular discs, repeated; used only to ornament a small bead moulding. (See A and C, Plate XL.)

Beak-moulding (bēk-mōld'ing). A moulding with a downward projecting part on its exterior edge—the whole outline somewhat resembling a bird's beak—to make a drip for rain water and prevent it from working back against the face of the wall beneath. See M, Fig. 46.)

Bell-shaped (bel'-shāpt). In the form of a bell; flaring. (See Fig. 73.)

Belly (bel'ĭ). The slight swell, or increase in diameter, which sometimes occurs between the base and neck of a column. It may refer to that part near the center of the column where its diameter becomes greater than at the base. (See at "Shaft," Fig. 61.)

Belt course (belt kōrs). A course of stone or moulded work carried at the same level across or around a building. (See F, Fig. 2.)

Beni-Hassan (bā'nē-has'san). A village on the Nile, near which are several ancient rock-cut tombs dating from about 3000 B. C.

Beneventum (ben-e-ven'tum.) An inland town of Italy, northeast of Naples, where there is an arch of date 114 A. D. erected in honor of Trajan.

Boss (bos). A projecting ornament, placed at the intersections of the ribs or groins in vaulted or flat roofs or ceilings, and in other situations. (See in doorway, Plate LVIII.)

Bounding wall. A wall enclosing any area or defining a boundary.

Bracket (brak'et). An ornamental projection—generally of partially rounded outline—intended to support a statue, pier, cornice, etc; a corbel. (See Figs. 133 and 139.)

C

Cable (kā'b'l). A small, raised moulding of rounded section, made to resemble the spiral twist of a rope; used for ornamenting the plain surfaces of fillets, or the furrows of flutings; when used on a column, this method of decoration is termed cabling.

Caisson (kās'son). A deep panel or coffer in a ceiling or soffit. (See Plates XXX and XXXI; also Fig. 103.)

Calyx (kā'liks). The outer covering of a carved flower ornament. (See Plate XV.)

Campanile (kamp'a-nil). A bell tower, especially one built separate from a church. (See Plate XXVI.)

Canals (ka-nalz'). The name sometimes given to the channels in the Doric triglyph. (See Fig. 7.)

Canalis (ka-nā'lis). The space enclosed between the fillets of the Ionic volute, convex in section in early work; and later, concave. (See Plate XLII.)

Canted (kan'ted). Set at an angle; tilted or moved from a horizontal line. (See volute in Fig. 120.)

Cap (kap). A top or crowning member, or series of members—as the capital of a column. (See Fig. 3.)

Capital (kap'i-tal). The uppermost part of a column, pillar, or pilaster, which serves as a crown to the shaft, and occurs between it and the entablature or other upper portions of the structure. (See Figs. 3 and 25.)

Capitoline (kap'i-to-lin). The name given to one of the seven hills on which Rome was built, situated at the end of the Forum; upon it was built the Capitol.

Caryatid (kar-i-at'id). Plural, **Caryatides.** A female figure serving as a column to support an entablature, or used in place of a column under any other similar conditions. (See Figs. 80 and 81.) Corresponding male figures are called Atlantes.

Castor and Pollux (kas'tor and pol'luks). Two Greek deities in whose honor was erected a temple at Cora.

Catellus (ka-tel'lus). A Roman leader, under whose direction the Tabularium in Rome was built.

Cathetus (kath'e-tus). The vertical line drawn through the eye and volute of the Ionic capital, upon which is based the geometrical method of laying out the spiral. (See Fig. 11.)

Cauliculus (kau-lik'ū-lus). Plural, **Cauliculi.** The volutes or small stalks under the flower on the abacus in the Corinthian capital. Also sometimes called Helices (plural of Helix). (See Plates XV and XVI.)

Cavetto (ka-vet'ō). A hollowed-out or concave moulding. (See Fig. 5.)

Cella (sel'a). The room or chamber containing the image of the Deity, which formed the nucleus of an ancient Greek or Roman temple, as distinguished from the additional rooms often combined with it to form the complete temple. (See Figs. 33, 34, and 67.)

Channel (chan'el). (*a*) One of a series of grooves, usually vertical and of elliptical section, separated by sharp edges or arrises, and forming a characteristic feature of the shaft of the Greek Doric Order. The channel is to be distinguished from the flute, of which the section is an arc of a circle. (See Fig. 49.) (*b*) The V-sunk incision occurring in the face of the Doric triglyph. (See Fig. 7.)

Chambers (chām'berz), **Sir William.** An English architect and writer on architecture, belonging to the end of the English Renaissance period.

Chamfer (cham'fer). A slope or bevel generally referring to anything originally right-angled, as a square corner, cut away so as to make an angle with the sides that form it. (See B, Figs. 47 and 48.)

Cheneau (shā'nō). A cresting or ornamental motive on the upper part of a cornice. The gutter, and also the projecting pipe to carry away water from the gutter. (See Plate L.)

Choragic (kō-rāj'ik). Pertaining to, or in honor of, a choragus. (See Figs. 75, 76, and 77, and Plate XLIX.)

Choragus (ko-rā'gus). The Greek title given to the superintendent of a musical or theatrical entertainment, who provided a chorus at his own expense.

Classic (klas'ik). Relating to ancient Greek and Roman work as examples of architecture of the first rank or estimation, which are still studied as the best models of fine building. Established by custom and precedent as a model—hence correct; pure; and, sometimes, coldly perfect.

Clepsydra (klep'si-dra). A water clock, a contrivance used anciently for telling time by the gradual, measured discharge of water from a small aperture, the flow for a given unit of time being first determined.

Clearstory (klēr'stō-ri). The upper story of a church, perforated with windows forming chief source of light for central portions of the building. It stands above the triforium or blind story, where such is present. Spelled also Clerestory.

Cloister (klois'ter). The covered passageway connecting a cathedral and chapter house, or running around a courtyard.

Coffer (kof'er). A sunk panel or compartment of an ornamental character in a ceiling or soffit; generally enriched with mouldings, and having a rose, star, or other ornament in the center. (See Fig. 14.)

Collarino (kol-a-rē'no). The necking of the Doric or Ionic column. (See Fig. 10 and Plate XLIII.)

Colosseum (kol-o-sē'-um). A celebrated amphitheater at Rome. Was commenced 72 A. D. by Vespasian, continued by Titus, and finally dedicated by Domitian in 82 A. D. Sometimes spelled Coliseum. (See Fig. 112.)

Colonnade (kol-o-nād'). A row of connected columns placed at regular intervals. (See Plate XXV.)

Column (kol'um). A part of the Classic Order (see Fig. 3). A solid, vertical body of greater height than thickness, generally serving as a support. A cylindrical or slightly tapering body set vertically upon a stylobate, and surmounted by a spreading mass which forms its capital.

Columniation (ko-lum'ni-ā-tion). An arrangement of columns where their placing and relation to each other form a principal feature of a design.

Comparative (kom-par'a-tiv). In proportion or in relation to another member or part.

Composite (kom-poz'it). The name of the last of the five Orders, and a "composite" of them all, the proportions being borrowed from the Corinthian, while the capital which characterizes it is composed from those of the other Orders, borrowing a quarter-round from the Tuscan or Roman Doric, the leafage from the Corinthian, and volutes from the Ionic Order. (See Fig. 17.)

Concord (kon'kord). (*a*) The name of one of the principal Greek Doric temples of Agrigentum. (*b*) A Corinthian temple in Rome of date about 7 B. C., belonging to the Augustan period.

Congé (kon'zhā). A moulding in the form of a quarter-hollow or a cavetto; an apophyge. (See Fig. 5.)

Constantine (kon'stan-tīn). One of the emperors of the East (A. D. 272-337), after whom is named a Corinthian triumphal arch in the Roman Forum. (See Fig. 136.)

Console (kon'sōl). A supporting bracket, generally greater in height than its projection. (See Figs. 13 and 16.)

Contour (kon'toor). The outline of the face or surface of a moulding or projecting feature of any sort; the configuration of the surface of the ground or landscape. (See Plate XXXIX.)

Coping (kō'ping). The capping or covering of a wall, usually projecting over it, and beveled to throw off water.

Cora (kō'ra). A city in southern Italy (the modern Cori), containing an example of a rectangular Roman Doric temple of unusual grace and artistic feeling, dating from about 80 B. C. (See Figs. 109 and 138.)

Corbel (kor'bel). A projecting block of stone, or a series of bricks or stones set out one over another to form a bracket or to support an overhanging member of wall. (See Fig. 97.)

Corinth (ko'rinth). A city of Greece situated on the isthmus of Corinth, famous for its early Greek Doric temples.

Cornice (kor'nis). Any moulded projection which crowns or finishes the object to which it is affixed; the uppermost division of an entablature. (See Fig. 3.)

Corinthian (ko-rin'thi-an). The most ornate and slender in its proportions of the three main Classic Orders. (See Figs. 50 and 128.)

Corona (kō-rō'na). The projecting, crowning member of a cornice, situated above the bed-moulding. (See page 108.)

Cossutius (cos-sū'shi-us). A Roman architect, who probably designed the capitals in the Temple of Jupiter Olympus at Athens.

Coupled (kup'ld). Linked together. "Coupled columns" are arranged in pairs, with their bases and capitals touching, and with a correspondingly wider span between the grouped pairs. (See Figs. 19 and 20.)

Cove (kōv). A cavetto, or concave moulding; a member whose section is a concave curve. (See Fig. 5.)

Cresting (kres'ting). An ornamental finish to a wall or ridge. The upper member of a cornice or ridge, generally intended to be decorative in character. (See Plate L.)

Crowning (krou'ning). Finishing at the top. The upper member of a cornice or other architectural form. (See Fig. 5.)

Cupola (kū'pō-la). A small vaulted structure affixed to the roof of a building, generally hemispherical or curvilinear in outline, covering a circular or polygonal area, and supported either upon four arches or upon solid walls.

Curvilinear (kur-vi-lin'ē-ar). Bounded by curved lines.

Cusp (kusp) The intersecting point of the small arcs decorating the internal curves of Gothic foils; also the figure formed by the intersection of such arcs.

Cyclopean (sī-klō-pē'an). Pertaining to the Cyclops, a fabled race of giants: therefore, large in scale and massive in size.

Cylindrical (si-lin'dri-kal). Having the form of a cylinder; the term is also applied to a section having an extended convex surface.

Cyma (sī'ma). A moulding whose section is a double curve or wave-like in form. (See Fig. 5.)

Cyma recta (sī'ma rek'ta). A cyma whose section is hollow in its upper part and swelling below. (See Fig. 5.)

Cyma reversa (sī'ma re-ver'sa). A cyma of section swelling above and hollow below; same as ogee. (See Fig. 5.)

Cymatium (si-mā'shi-um). A crowning moulding composed of the cyma. (See Plate IX.)

GLOSSARY

D

Dado (dā'do). The die, or the square or rectangular intermediate part, of the pedestal to a column, located between the base and the cornice; also, that part of a straight pilaster between the plinth and the impost moulding; also, the finishing of the lower part of the walls in the interior of a house. (See Fig 3.)

Daphnis (daf'nis). A Greek architect of Miletus.

Decastyle (deka'stīl). Having ten columns in front, or consisting of ten columns.

Degree (dē-grē'). (*a*) A synonymous term for "part" used in the measurement and proportioning of the Orders. (*b*) A proportional part of an arc of a circle.

Delos (dē'los). An island of the Ægean Sea, celebrated for its Greek Doric Temple of Apollo.

Demeter (de-mē'ter). Goddess of agriculture; the Roman Ceres. At Pæstum and at Eleusis there are remains of temples dedicated to her.

Denticular (den-tik'ū-lar). Containing dentils; when applied to an Order, containing a course of small rectangular blocks in the cornice. (See Plate IV and Fig. 110.)

Dentil (den'til). One of the series of small cubes into which the square member in the bed-moulding of an Ionic, a Corinthian, a Composite, or, occasionally, a Roman Doric cornice is cut. (See Plate IV and Fig. 110.)

Detail (dē-tāl'). Enlarged portion, a section or part of a plan or elevation, usually drawn at large scale for the use of the workmen.

Diagonal (dī-ag'ō-nal). A straight line drawn from opposite angles, dividing a figure into two angular parts.

Diameter (dī-am'ē-ter). The distance through the shaft of a column from side to side; generally referring to the lateral distance through the lower part of a shaft immediately above the base moulding.

Diana Propylæa (dī-an'a prop-ī-lē'a). One of the smaller Greek temples at Eleusis, showing a simple use of columns *in antis*. (See Plates XXXV and XXXVI.)

Diastyle (dī'a-stīl). The term describing a Classic arrangement of columns, having the space of four diameters from center to center of their shafts, and where the intercolumniation measures three diameters. (See Fig. 19.)

Die (dī). The cubical part of the pedestal between its base and cap; the dado. (See Fig. 3.)

Dimension (di-men'shon). The measured distance between two points; the size of a room or building.

Diminution (dim-i-nū'shon). The gradual reduction in size towards the end of an object or column. Tapering.

Diocletian (dī-o-klē'shan). A Roman emperor, whose best known remaining architectural monument is the famous Baths in Rome, in the ruins of which have been found late (about 290 A. D.) Roman examples of the various Orders. (See Plate LVI.)

Dipteral (dip'te-ral). A structure consisting of or furnished with a double range of columns. (See page 148; also ends of Fig. 34.)

Ditriglyphic (dī-trī-glif'ic). An interval or space between two columns, admitting of the use of two triglyphs on the entablature. (See Fig. 18.)

Domitian (do-mi'sh-yan). A Roman emperor ruling 81-96 A. D.

Doric (dor-ik). The oldest, heaviest, and simplest of the three principal Greek and Roman Orders. (See Fig. 50.)

Drip (drip). A moulding or projecting member intended to throw off rain water and prevent its running down the wall of a building. (See H and M, Fig. 46.)

E

Eaves (ēvz). The edge or lower part of a roof projecting beyond the surface of the wall to throw off water. (See Fig. 59.)

Eccentric (ek-sen'trik). Not having the same center; referring to circles, which, though related, are not struck from the same center.

Echinus (e-kī'nus). (*a*) Properly the egg-and-dart ornament cut or painted on the quarter-round moulding that occurs in column capitals. (*b*) The convex projecting moulding—of eccentric curve in section in Greek examples—supporting the abacus of the Doric capital; hence the corresponding feature in the capitals of the other Orders, or any moulding of similar profile to the Doric echinus. (See Fig. 5.)

Egg-and-Dart (see Echinus). A Classic moulding decorated with an oval, egg-shaped ornament alternating with a narrow, pointed, dart-shaped form, used only to decorate an echinus. (See I, Plate XL.)

Eleusis (ē-lū'sis). A city of Attica famed for the celebration of the mysteries of Demeter.

Elevation (el-ē-vā'shon). A geometrical drawing of a vertical wall, or a part of a building or other structure in vertical projection. (See Fig. 2.)

Encarpus (en-kar'pus). A sculptured ornament in imitation of a festoon of fruits, leaves, or flowers, or of other objects, hanging between two points. (See Figs. 119 and 130.)

Engaged (en-gā'jd). Attached; especially a circular column built one-third or one-quarter into a wall, the remainder projecting beyond and free from the wall face. (See B. Fig. 100.)

Entablature (en-tab'la-tūr). That part of a lintel construction, or of a Classical structure, consisting of horizontal members, which rests upon supporting columns or vertical members and extends upward to the roof. In the Classic Orders it comprises the architrave, frieze, and cornice. (See Fig. 3.)

Entasis (en'tā-sis). A swelling or outward curve along with an inward taper in the vertical profile of the shaft of a column. (See Fig. 87.)

Epicurius (ep-i-kū'ri-us). A famous physician. A temple to Apollo Epicurius erected at Phigalia. (See Fig. 64.)

Epidauros (ep-i-dau'ros). A town in Argolis, chief seat of the worship of Æsculapius, containing several examples of late Greek (architecture, particularly a tholos or circular temple. (See Plate L and Fig. 78.)

Epistylium (e-pi'stī-li-um) or **Epistyle** (e'pi-stīl). The architrave of a Classic entablature. See Architrave.

Erechtheum (ē-rek-thē'um). An Ionic temple on the Acropolis at Athens, begun 479 B. C., completed 408 B. C. (See Figs. 68, 80-85.)

Eustyle (ū'stīl). Denoting an arrangement of columns having an intercolumniation or space between column shafts of two and one-fourth diameters. (See Fig. 19.)

Exedra (eks'e-dra). A raised, semicircular or elliptical platform with seat facing towards the center, often used in public places as a memorial.

Extrados (eks-trā'-dos). The exterior curve of an arch. (See Fig. 96.)

F

Façade (fa-sad'). The front view or elevation of an edifice, or any one of its principal faces if it has more than one. (See Fig. 45.)

Façure (fa'shur). A plain facing of varying width defined by angles or mouldings upon each side, as in the architrave of the Classic entablature.

Fascia (fash'i-a). Any broad, flat member or moulding with but little projection, as the horizontal bands or broad fillets into which the architraves of the Ionic and Corinthian entablatures are divided. (See Plates V and XI.)

Faustina (faus-tī'na). Wife of Antoninus Pius; notorious for her licentiousness. (See Plate LIV.)

Fenestration (fen-es-trā'shon). An arrangement of windows where their placing and relation to each other form the principal feature of the design.

Fillets (fil'ets). Small mouldings having the appearance of narrow, flat bands. When on wall surfaces, they are rectangular in projecting section. They are generally used to separate other ornaments and mouldings. (See Fig. 5.)

Floweret (flou-er-et'). A small flower; one of the parts of the Classic Corinthian and Composite capitals. (See Plate XV.)

Flute (floot). One of a series of curved furrows, usually semicircular in plan, separated by narrow fillets. (See F, Fig. 49, and Figs. 55 and 56.) When such fillets are partially filled up by a smaller, raised, semicircular moulding section, they are said to be cabled.

Fluting (floo'ting). A groove or furrow; the system of decorating by the use of flutes. (See Flute.)

Fortuna Virilis (for-tū'na vir-ī'lis). A Corinthian temple in Rome. (See Fig. 123.)

Frieze (frēz). That part of an entablature which is between the architrave and the cornice. (See Fig. 3.)

Frontispiece (fron'tis-pēs). The principal front of a building; an ornamental figure or illustration facing the title-page of a book.

Fust (fust). The shaft of a column, or the trunk of a pilaster. (See Fig. 3.)

G

Gable (gā'bl). The name given to an angular-shaped wall surface projecting from a roof, when occurring directly above a horizontal cornice and bounded by raking cornices. (See Plate XXXV.)

Gibbs (gibz), **James.** One of the best known English architects and writers of the Renaissance.

Girth (gerth). The circumference of anything; or the distance around a column.

Glyphs (glifs). The channels cut in the face of the Doric triglyph. (See Fig. 7.)

Greek Fret (grēk fret). A geometrical, repeating ornament, generally used to ornament a fascia, band, or frieze. (See L and N, Plate XL.)

Grille (gril). The barred metal work—or other material—forming an enclosing screen, or protecting the openings of a structure. (See doorway, Plate LVIII.)

Groined (groind). The term applied to the curved intersection of two vaults meeting each other at any angle. (See Fig. 27.)

Guilloche (gi-lōsh'). The term given a series of interlocking circles or curved lines forming an ornamental, repeated design; a Classic method of decorating a flat or slightly curved band. (See M and O in Plate XL.)

Guttæ (gut'ē), pl. of **Gutta.** One of a series of pending ornaments, generally in the form of a frustum of a cone—but sometimes cylindrical—attached to the underside of the mutule and regula of the Doric entablature. (See Figs. 7 and 8.) They probably represent the wooden pegs or tree-nails which occupied these positions in primitive wooden construction.

H

Hadrian (hā'drĭ-an). Roman emperor, A. D. 76-138. Did much towards restoring and improving Rome. Erected temples to Trajan, Venus, etc.

Halicarnassus (hal-i-kar-nas'sus). A Dorian city in Asia Minor, famous for the mausoleum built there by Artemis for her husband.

Hatching (hach'ing). A method of drawing diagonal parallel lines to indicate or emphasize certain parts of a design; when these are crossed by other lines, the drawing is termed cross-hatching. (See C, D, E, and F, Fig. 2.)

Helix (hē'liks), pl. of **Helices** (hē'lis-ēz). Any spiral; particularly a small volute or twist under the abacus of the Corinthian capital. (See Cauliculus.)

Hera (hē'ra). Wife of Zeus. Queen of the heavens. There existed a famous statue of her in the Temple of Argos, and at Samos a Greek Ionic Temple in her honor.

Hercules (her'kū-lēz). A Greek god. At Cora is an early Roman Doric square temple of Greek workmanship, called by his name. (See Fig. 139.)

Hermes (her'mēz). A small, square shaft, generally tapering toward the bottom and terminating at the top in a bust or head.

Hexastyle (heks'a-stīl). Having six columns. (See Fig. 33.)

Hypæthral (hī'pē'thral). Open to the sky; lacking a roof. (See Fig. 34.)

Hypostyle (hī'pō-stīl). Containing pillars.

Honeysuckle (hun'i-suk-l). An architectural ornament suggested by the flower, generally used on a decorative frieze. (See Q in Plate XL.)

Hypotrachelium (hī'pō-trā-kē'li-um). In the Doric Order the junction of the capital and the shaft, marked by a bevel or cut around the lower edge of the capital block. (See Fig. 39.)

I

Ictinus (ic-tī'nus). A famous architect of Greece belonging to the second half of the 5th century B. C. He was the chief designer of the Parthenon and of the Temple of Apollo near Phigalia.

Ilissus (i-lis'sus). A small river in Attica that flows through a part of the city of Athens.

Impost (im'pōst). The horizontal mouldings which receive, or upon which rest, an arch springing from a wall or square column. (See Fig. 4.)

Intercolumniation (in'ter-ko-lum-ni-ā'shon). A spacing apart of columns. The distance in the clear between columns. (See Figs. 18, 19, 89, 90, 143, 144, and 145.)

Interior (in-tē'ri-or). The inside of a building, house, or room.

Intersection (in-ter-sek'shon). The crossing of any two or more lines at any angle with each other.

Intrados (in-trā'dos). The interior curve of an arch. (See Fig. 96.)

Ionic (ī-on'ik). One of the three Greek Orders—named from the Ionic race, by whom it is held to have been developed and perfected—the most distinguishing feature of which is the volute of the capital with its "roll" ends and two faces. (See Fig. 50.)

J

Jambs (jamz). The vertical side pieces of any opening in a wall, such as a door or window, the top being generally termed a soffit. (See Fig. 84.)

Jupiter Olympus (jū'pi-ter ō-lym'pus). The supreme Greek deity. The best known temple to this god is the Corinthian building at Athens, begun by Greek workmen about 170 B. C., and finished by them 117 A. D. under Hadrian. (See Plate LII.)

K

Kanawat (kan'a-wat). A town in Syria containing some examples of early Roman architecture.

Keystone (kē'stōn). The stone at the apex of an arch, which, being last put in place, is regarded as keying or locking the whole structure together. (See Figs. 13 and 98.)

L

Lacunaria (la-kū-nā'ri-a). A paneled ceiling, so called from the sunken or hollow compartments composing it. (See Plates XXX and XXXI, and Fig. 103.)

Lateral (lat'e-ral). Proceeding from or to, or situated at, a side; or at right angles to the length or height. (See Fig. 61.)

Leaf and-Dart (lēf-and-dart). An ornamental design—water plant and arrows—applied to the ogee. (See G and J, Plate XL.)

Lintel (lin'tel). A horizontal piece of timber or stone resting across columns or piers, or upon the jambs of a door or window, or spanning any other open space in a wall or in a columnar construction, and serving to support superincumbent weight. (See Fig. 2.)

Listel (lis'tel). A small, square moulding generally used in conjunction with a larger member; also termed a fillet. (See Fig. 5.)

Lobes (lōbz) Projections, especially when of a rounded form.

Longitudinal (lon-ji-tū'di-nal). Of or pertaining to length.

Lotus (lō'tus). An Egyptian water plant, often used as a decorative motive in Egyptian architectural forms.

Lozenge (loz'enj). A figure having four equal sides, with two acute and two obtuse angles. (See Fig. 9.)

Lysicrates (lī-sik'ra-tēz). The name of a Greek choragus, which has been given to the finest surviving Greek choragic monument. (See Figs. 75, 76, and 77.)

M

Macedonia (mas-ē-dōn'i-a). A country north of Greece.

Marcellus (mar-sel'lus). The Theater of Marcellus is the name of a Roman Doric building of circular plan, built in Rome. (See Figs. 113 and 125.)

Mars Ultor (marz ul'tor). (Sometimes called Mars Vengeur.) Mars was the Roman god of war. A temple in the Forum Augusti consecrated B. C. 2, built in the time of Augustus. (See Fig. 129.)

Mechanical (mē-kan'i-kal). Exact; the opposite of free; inartistic; laid out according to strict rule.

Member (mem'ber). A part of an Order or of a building; a column or a moulding.

Metope (met'ō-pē). A slab inserted between two triglyphs of the Doric frieze; sometimes, especially in late work, cut in the same block with one triglyph or more. (See Fig. 54.)

Minerva Polias (mi-ner'va po'li-as). The name of a Greek Ionic Temple on the Acropolis in honor of one of the three chief Greek divinities, the daughter of Jupiter. (See Plate XLIV.) A temple in honor of the same goddess was erected at Priene in Asia Minor. (See Plate XLVI.)

Miletus (mī-lē'tus). A town in Asia Minor near which is the temple of Apollo Didymæus. (See Fig. 94.)

Minute (min'it). One of the divisions of the module, generally thirty in number for the Greek Orders, twelve for the Roman Doric, and eighteen for the Roman Ionic and Corinthian. (See Part.)

Miter (mī'ter) An angle of 45°; or, in construction, the union of two pieces of moulding at an angle of 45°. When the abutting pieces are dressed to an angle greater or less than 45°, the joint is properly called a bevel-joint (See Fig. 20.)

Modillion (mō-dil'yon). A projecting bracket or block used under the corona in the cornice of the Corinthian, the Composite, and—occasionally—the Roman Doric Orders; a corbel; a bracket. (See Fig. 133.)

Module (mod'ūl). A unit of measure used in working out the proportional parts of an Order of architecture, invariably one-half the diameter of the column at its base.

Monotriglyphic (mon-ō-trī-glif'ik). That mode of intercolumniation which, in the Doric Order, requires the spaced use of one triglyph and two metopes in the entablature above. (See Fig. 18.)

Moulding (mōld'ing). An architectural ornament or member with a surface of varying contour; a projecting member. (See Fig. 5.)

Mutule (mū'tūl). A projecting piece in the form of a flat block with an ornamented under-surface, placed under the corona of the Doric cornice and corresponding to the modillion of the other Orders. (See Fig. 8.)

N

Naos (nā'os). The central room of a Classic temple, where were placed the statue and ceremonial altar of the divinity. (See Figs. 32, 33, and 34.)

Nave (nāv). The main central portion of a church extending—between the side columns—from the choir back to the main entrance.

Neck (nek). The part of a column occurring between the capital and the shaft. (See Fig. 3.)

Nemea (ne-mē'a). A valley in Argolis, celebrated for the Temple of Zeus Nemeus. Also where the Nemean games were held.

Nerva (ner'va). The name of one of the Roman Forums.

Niké Apteros (nī'kē ap'te-ros) A temple on the Acropolis built in honor of Niké, goddess of Victory. Also called Wingless Victory.

Nimes (Nēm). A city in southern France containing a Corinthian rectangular temple approached by a flight of steps, built during the reign of Hadrian, often called the Maison Carrée. (See Fig. 131.)

Nortia (nor'cha). A small Etruscan town in central Italy.

Normand (nor'maund). A French writer on architecture living during the Renaissance.

O

Octastyle (ok'ta-stīl). Having eight columns—as a portico of a building having eight columns in front. (See Fig. 34.)

Odeum (ō-dē'um). One of a class of buildings akin to theaters, designed primarily for the public performance of musical contests of various kinds.

Ogee (ō-jē'). A cyma recta or cyma reversa; a moulding consisting of two members, the one concave, the other convex, or a round and a hollow. (See Fig. 5.)

Opisthodomos (op-is-thod'ō-mos). An open vestibule within the portico of a temple at the end behind the cella; in most ancient temples corresponding to the pronaos at the principal end.

Order (or'der). A column entire (including base, shaft, and capital), with a superincumbent entablature, viewed as forming an architectural whole or the characteristic element of a style. (See Figs. 3 and 50.)

Orientation (ō-ri-en-tā'shon). The location of a structure in regard to the direction it faces, especially in fronting toward the east.

Outline (out'līn). A line which marks or bounds the outside of a figure; a sketch of any scheme.

Ovolo (ō'vō-lō). An egg-shaped moulding in Roman work, sometimes a quarter of a circle in section, but—in Greek work—generally part of an ellipse or hyperbola. (See Fig. 5.)

P

Pæstum (pēs'tum). A city in Lucania famous for the ruins of two or more Doric temples.

Palatine (pal'a-tīn). One of the seven hills of Rome.

Palladio (pal-lad'i-ō). An Italian writer and architect, best known for his palaces at Vicenza and churches at Venice. The last great architect of the Italian Renaissance.

Palmette (pal-met'). A conventional floral ornament or leaf, more or less resembling a palm leaf. (See P and Q, Plate XL.)

Palmyra (pal-mī'ra). A town in Syria, long since deserted, where yet remain extensive and superb Roman ruins.

Pandrosos (pan-drō'sos). Daughter of Cecrops. In her honor a temple sanctuary was built at Athens.

Panel (pan'el). A compartment with raised margins, moulded or otherwise, as in ceilings, wainscots, and the like. (See Fig. 9.)

Pantheon (pan'thē-on). A large, circular temple with a Corinthian portico, in Rome, originally dedicated in reign of Augustus B. C. 27—A. D. 14. The columns, entablatures, etc., of the portico of the present building, which dates mostly from 120-124 A. D., were parts of the original structure. (See Figs. 102 and 103.)

Parapet (par'a-pet). A low wall protecting the edge of a terrace, bridge, declivity, etc. (See Plates XXXII and XXXIV.)

Part (part). (*a*) The unit into which the module or one-half diameter, of columns is divided in laying out the Roman orders; $\frac{1}{12}$ of the module for the Tuscan and Doric, and $\frac{1}{18}$ of the module for the Ionic, Corinthian, and Composite Orders. (*b*) A separate division, fraction, or fragment of a whole.

Parthenon (par'the-non). The Temple of Athene Parthenos at Athens. It crowned the Acropolis, and is regarded as the most nearly perfect building in the world. Begun about 450 B. C. after designs by Ictinus and Callicrates, under the political direction of Pericles, and the artistic superintendence of the great sculptor Phidias. Dedicated 438 B. C. (See Frontispiece illustration; also Fig. 45.)

Pedestal (ped'es-tal). The base or foot of a column, statue, or the like; the part on which an upright work stands; it consists of three parts, the base, die, and the cap or cornice. (See Figs. 3 and 25.)

Pediment (ped'i-mĕnt). The gable or trianguar end of the roof of a building. (See Fig. 20.)

Pelasgians (pel-as'ji-ans). Name given to the earliest inhabitants of Greece.

Pendentives (pen-den'tivz). The vaulted portions supporting the angles of a domed cupola. (See Fig. 28.)

Pentelic (pen-tel'ik). A Classic variety of pure, fine-grained marble, obtained from Mount Pentelicus in Attica.

Pericles (per'i-klēz). A celebrated Athenian statesman and orator. Born about 495 B. C; died at Athens 429 B. C. The Age of Pericles was the Golden Age of Greece, the period of its highest political, artistic, and literary development.

Peripteral (pe-rip'te-ral). Having a row of columns all around. (See Figs. 33 and 34.)

Peristyle (per'i-stīl). A range or ranges of columns surrounding any part of a temple or house. (See Figs. 33 and 34.)

Perspective (per-spek'tiv). (*a*) A drawing or rendering of an object so as to show it as it would actually appear to the eye of a spectator. The projection—geometrically—on a picture plane so that the object drawn will appear as when seen from some particular point. (*b*) The apparent vanishing of parallel lines as their distance from the eye is increased.

Phidias (fid'i-as). A celebrated Greek sculptor born about 500 B. C.; died about 430 B. C. He was associated with Pericles in the artistic beautifying of Athens. His greatest work was the colossal gold and ivory statue of Athene (Minerva) which adorned the cella of the Parthenon.

Phigalia (fī-gā'li-a). An ancient town in the Peloponnesus. Also spelt Phigalæa. Noted for its Temple of Apollo.

Pier (pēr). A mass of masonry, generally square in plan, used for support or to stiffen a wall. (See D, Fig. 2, and Fig. 4.)

Pillar (pil'ler). A round pier carrying the arches or wall of a building. (See C, Fig. 2.)

Pilaster (pi-las'ter). A rectangular column or pier, attached to a wall and projecting about one-fourth to one-sixth of its breadth from the wall surface, corresponding in cap, base, and general proportions with the columns of the Order with which it is used; but the shaft entasis of the column is frequently omitted from the pilaster. (See Fig. 92.)

Plan (plan). A drawing on a plane surface, of the horizontal section of an object, and intended to show its arrangement and disposition; generally applied to the horizontal projection or section of a building drawn at a small scale. (See Fig. 2.)

Plane (plān). Level; an even surface without elevations or depressions.

Platform (plat'form). A floor raised above the general level, for the support of objects or people.

Plinth (plinth). A member, square in plan and rectangular in elevation, forming the lowest division of the base of a column. (See Fig. 4.) The plane, projecting surface at the bottom of a wall, immediately above the ground.

Plumb (plum). Perpendicular.

Pollux (pol'lux). A Greek god, brother of Castor. (See Castor.)

Polycletus (pol-ĭ-klē'tus). A celebrated Greek sculptor and architect who lived in the last part of the fifth century B. C.

Polystyle (pol'i-stīl). Having or supported by many columns, or surrounded by several rows of columns.

Pompeii (pom-pā'yē). A city in Campania founded 6th century B. C., buried 79 A. D. by an eruption of the volcano of Vesuvius.

Pompey (pom'pi). Famous Roman general; born 106 B. C.; murdered in Egypt in 48 B. C. Formed with Cæsar and Crassus the First Triumvirate, 60 B. C.; later a political rival of Cæsar, by whom he was crushed in civil war. A theater of the Roman early period built by Pompey himself.

Porch (pōrch). A kind of outside vestibule or projecting structure sheltering the entrance to a building. (See Figs. 68 and 74.)

Portico (por'ti-kō). The covered space or porch in front of a temple. (See Fig. 102.)

Poseidon (po-sī'don). God of the Sea, and said to have built the walls of Troy. Worshiped throughout Greece and Italy. Identified with the Roman Neptune.

Posticum (pos-tī'kum). The covered space behind a temple.

Priene (prī-ē'nē). An Ionian city situated in Caria, Asia Minor, north of Miletus. Noted for its Ionic Temple of Minerva Polias. (See Plate XLVI and Fig. 93.)

Profile (prō'fēl or -fīl). The largest contour or outline of any object, especially when seen in silhouette. (See Fig. 5.)

Projected (prō-jek'ted). Carried out; extended; continued; delineated according to any system of correspondence between the points of a figure and the points of the surface on which the delineation is made.

Prone (prōn). Prostrate or lying with face down. (See Fig. 5.)

Proportionate (prō-pōr'shon-āte). Bearing a certain harmonious relation to other members or adjoining parts.

Propylæa (prop-i-lē'a), pl. of **propylæum** (prop-i-lē'um). An important architectural vestibule or entrance to a sacred enclosure, as that of the Acropolis at Athens. (See Fig. 88.)

Proscenium (prō-sē'ni-um). The stage of a theater; the wall separating the stage from the auditorium. In the Classic theater the wall breaks back and goes across the rear of the stage, completely enclosing the portions of the stage used by the actors, and generally contains three openings through the back or curtained wall—one in the center, and two smaller ones on each side—and one in each end or return of the wall. In the modern theater, the proscenium is that part of the house between the curtain or drop-scene and the orchestra; also, the curtain and the arch or framework that holds it.

Prostyle (prō'stīl). Denoting a portico in which the columns stand out entirely in front of the walls of the building to which it is attached; also denoting a temple or other structure having columns in front only, but across the whole front. (See Plate XXXIII.)

Pseudo-dipteral (sū-dō-dip'te-ral). The term applied to a temple falsely or imperfectly dipteral, the inner range of columns surrounding the cella being omitted. (See Fig. 33.)

Pteroma (te-rō′ma). The space between the wall of the cella of a Classical temple or any similar columnar structure, and the pteron or the columns of the peristyle. (See Figs. 33 and 34.)

Purlin (pur′lin). Small roof beams resting upon the rafters and running parallel with ridge and eaves.

Pycnostyle (pic′nō-stīl). A term denoting a colonnade in which the columns stand very close to each other, usually only 1½ diameters being allowed to each intercolumniation. (See Fig. 19.)

Pylon (pī′on). A monumental structure forming part of an entrance to an Egyptian temple or other important building, and consisting of a central gateway flanked on each side by a truncated, pyramidal tower with walls covered with sculptures, the pyramidal tower itself being sometimes called a pylon.

Pyramidal (pi-ram′i-dal). Pertaining to, or having the form of, a pyramid.

Q

Quirinal (quir′i-nal). One of the seven hills of Rome, on which is built the former summer Palace of the Popes. Here is the present seat of the Italian Government, the pontifical residence now being the Palace of the Vatican.

R

Radial (rā′di-al). Shooting out or radiating from a center.

Radius (ra′di-us). A line drawn or extending from the center of a circle to its circumference; the semi-diameter of a circle or sphere.

Rafter (raf′ter). One of the sloping beams of a roof, running from ridge to eaves, to which is secured the framework or purlins upon which the outer covering is nailed.

Reglet (reg′let). A flat, narrow moulding used to separate members of compartments and panels. (See Fig. 9.)

Regula (reg′ū-la). A short band or fillet of a length corresponding to the triglyphs of the Doric frieze, bearing guttæ or drops on the lower side, and placed just below the crowning tænia of the architrave. (See Fig. 7.)

Return (rē-turn′). The turn and continuation of a moulding, wall, etc., in an opposite or different direction.

Reveal (rē-vēl′). The return at the side of an opening, or at the end of a perpendicular moulding; the vertical face of a window-opening or doorway between the face of the wall and that of the window-frame or door-frame. (See Fig. 84.)

Roll (rōl). In the Ionic Order, the rounding end of the volute, which rolls up on itself. (See Fig. 61.)

Rosette (rō-zet′). A carved, conventionalized imitation of a rose or other design of similar, circular outline, executed in some material. (See Fig. 9.)

Running dog (run′ing dog′). A Classic, ornamental moulding, generally used in a frieze or band, resembling the wave ornament. (See M in Plate XL.)

Rusticated (rus′ti-kā-ted). Referring to the treatment of a stone wall surface, where separate blocks are left with a rough-hewn surface projecting from the line of the joints, which are recessed in chamfered or rectangular grooves, and whose width is emphasized. (See Fig. 75.)

S

Saturn (sa'turn). A Roman god to whom was built at Rome an elaborate Corinthian temple.

Scale (skāl). A means of proportionate measurement; graduated, especially when employed as a rule, being marked by lines or degrees at regular intervals. (See at lower right corner, Plate II.)

Scamozzi (ska-moz'zi). An Italian writer and architect, a follower and pupil of Palladio. (See Fig. 120.)

Scipio (sip'i-ō). The name of several Roman generals whose Tombs near the Appian Way are well known. (See Fig. 108.)

Scotia (skō'ti-a). A concave moulding, as between the fillets in the base of the Doric column; used especially beneath the level of the eye. (See Fig. 5.)

Screen (skrēn). Any wall or construction, permanent or temporary, which covers or protects a portion of a building, room, or other space from direct observation. A meshwork placed in a frame to protect a portion of a building, or an opening, from the entrance of insects. (See Plate LVIII.)

Segesta (se-jes'ta). A town in the northwestern part of Sicily, containing some very beautiful Greek architectural ruins, especially that of a Doric temple of the 6th century B. C.

Segmental (seg-men'tal). Relating to or being a segment or part of a thing.

Selinus (se-lī'nus). A town in southwestern Sicily, celebrated for the ruins of the Temple of Zeus.

Septimius Severus (sep-tim'i-us se-vē'rus). A Roman emperor, 193-211 A. D., in whose honor was erected a triple archway with Composite columns He died at York, England.

Serlio (ser'lē-ō), **Sebastiano**. An Italian architect and writer living during the time of the Renaissance. He designed a considerable number of buildings in France.

Shaft (shaft). That part of the column extending from the capital to the base. (See Figs. 3 and 61.)

Sill (sil). The horizontal member at the bottom of a door or window (see Fig. 84); a piece of timber or stone on which a structure rests. (See Fig. 84.)

Soffit (sof'it). Ceiling; applied to the under side of arches and of other architectural members. (See Figs. 9 and 14.).

Spandrel (span'drel). The triangular space comprehended between the outer curve of an arch, a horizontal line through its apex, and a vertical line through its spring; also, the wall-space between the outer mouldings of two arches and a horizontal line or stringcourse above them, or between these outer mouldings and the intrados of another arch rising above and inclosing the two. (See Fig. 4.)

Spiny (spī'ni). Pointed; sharply serrated; referring to certain forms of the Greek acanthus. (See Figs. 69 and 73, and Plate XLIX.)

Stadium (stā'di-um). A large, rectangular space with a rounded end, and open to the sky; it was intended for races, contests, and spectacles of various kinds, and surrounded by tiers of seats for spectators.

Staves (stāvz). The supports or stems holding up ornamental portions of the leafage on the Corinthian and Composite capitals. (See Plate XVI.)

Stele (stē'lē). A headstone or funeral monument used by the Greeks, generally ending with a crowning or cresting ornament including the akroter in some of its several forms. (See Fig. 86.)

Stoa (stō'a). A portico, usually a sheltered portico and often of considerable extent, conveniently located near a public place and intended to afford opportunity for walking or conversation.

Stringcourse (string'kōrs). A belt or continuous band of mouldings extending across the façade of a building. (See Fig. 2.)

Structure (struk'tūr). A building of any kind.

Stylobate (stī'lō-bāt). The platform —generally consisting of three steps, the upper forming the floor of the corridor or colonnade around the building —upon which the Classic Greek building or the columns of its surrounding colonnade rest. (See Plate XXXV and Fig. 45.)

Supercolumniation (sū'per-ko-lum-ni-ā'shon). The superposition of columns; the placing of one Order above another. (See Figs. 23 and 24.)

Superimposed (su'per-im-pōzd'). Laid on or added above something else, as one Order placed on top of another. (See Figs. 23 and 24.)

Superincumbent (sū'per-in-kum'bent). Lying or resting on something else.

Superposition (sū'per-po-si'shon). Placing one thing above another, as the use of a lighter Order for the second story of a building, placed above a heavier Order used for the first story. (See Figs. 21, 22, 23, and 24.)

Support (sup-pōrt'). A prop.

Swell (swel). Belly; referring to the slight increase in the size of the column between the base and the neck. (See Fig. 61.)

Systyle (sis'til). Having columns which stand two diameters apart, or three diameters on centers. (See Fig. 19.)

T

Tabularium (tab-ū-lăr'i-um). An early Roman building backing the Senate, and consisting of a tall wall crowned with a colonnade placed against an arcade in the characteristic Roman fashion. The first example of this usage of which we know. It dates from about 78 B. C.

Tænia (tē'ni-a). A fillet surmounting the Doric architrave. (See Fig. 7 and Plate IX.)

Taper (tā'per). The gradual diminution or reduction in size of an object—especially a column—towards its end or top. (See Fig. 87.)

Tetrastyle (tet'ra-stīl). Having or consisting of four columns. (See Plate XXXIII.)

Theseum (thē-sē'um). A temple to the Athenian hero, Theseus; especially a certain Doric temple built in Athens which is one of the three most perfect surviving Greek temples. (See Fig. 51.)

Tholos (thō'los) or **Tholus** (thō'lus). A circular building; a domed structure; *e. g.*, the Tholos at Epidauros. (See Fig. 78 and Plate L.)

Titus (tī'tus). Roman emperor, 79–81 A. D. He captured Jerusalem (70 A. D.) during the reign of his father Vespasian. The Arch of Titus in Rome was erected in commemoration of this event. (See Fig. 134.)

Tivoli (tēv'o-lē). A town near Rome celebrated for its circular temple of Vesta, showing an excellent example of the Roman Corinthian Order. (See Fig. 130.)

Torus (tō'rus). The large, convex moulding of semicircular profile used generally as the lowest member, and just above the plinth—when it is employed—of the column base. (See Fig. 5.)

Trajan (trā'jan). Roman emperor, 98–117 A. D. Famous for his wars against the Dacians and Parthians. Triumphal arches in his honor were erected at Rome and Ancona. (See Fig. 137.)

Triglyph (trī'glif). A decorative ornament occurring at regular intervals in the frieze of the Greek Doric Order, and bearing perpendicular incisions or channels upon its surface. (See Fig. 7.)

Tumble-home (tum'bl-hōm). Strictly, a nautical term referring to the tapering or sloping in of the sides of a vessel as they near the top of the boat; used in this connection as referring to a similar sloping-in of a column or building toward its top. (See Figs. 35 and 36.)

Tuscan (tus'kan). The simplest of the five Roman Orders of architecture, supposedly derived by the Romans from a combination of the Greek Doric with the local Etruscan columnar architecture. (See Fig. 6.)

Tympanum (tim'pa-num). The triangular area surrounded by the cornices of a pediment. (See Fig. 20.)

Type (tīp). The original model or kind which becomes the subject of copy; the mark or impression of something bearing a definite and unmistakable stamp; belonging to a special sort or family.

U

Undercut (un-der-kut'). In mouldings, having a section which overhangs, giving a deep hollow or dark shadow beneath. (See M, Fig. 46.)

V

Vanishing point (van'ish-ing point). An imaginary point towards which the horizontal lines of a building appear to converge.

Vault (vault). An arching structure of masonry, brick, or woodwork, forming a canopy, cover, or ceiling. (See Figs. 26 and 27.)

Vertical (ver'ti-kal). Being in a position or direction perpendicular to the horizon; upright; plumb.

Vespasian (ves-pāzh'yan). A Roman emperor, A. D. 70–79, during whose reign was commenced the Colosseum at Rome.

Vesta (ves'ta). The goddess of the vestal virgins. One Roman temple of this name exists at Tivoli. It still contains windows of the true Roman period. (See Fig. 130.)

Vestibule (ves'ti-būl). An entrance or passage hall next the outer door of a house, from which the doors open into the various inner rooms. A porch, lobby, hall.

Vignola (vē-nyō'la), **Giacomo Barozzi.** A Renaissance architect and student of architecture. Author of the well-known work on the Renaissance Orders of Architecture. He succeeded Michelangelo as the architect of St. Peter's, Rome.

Vitruvius Pollio (vi-troo'vi-us pol'i-ō). A Roman engineer and writer on architecture.

Volutes (vō'lūts). A kind of spiral scroll forming the principal ornament of the Ionic and a subordinate part of the Composite capitals. (See Fig. 61.)

Votive (vō'tiv). Devoted to some object or deity; generally in commemoration of a certain event or in consequence of a vow.

Voussoir (voos-swar'). One of the wedgelike stones forming an arch. (See Fig. 98.)

W

Wainscot (wān'skot). The wooden lining of walls, generally in panels and along the lower portion only of their height.

Wave ornament (wāv or'na-ment). A Greek decorative form of flowing curves, regularly repeated; generally used in a band or frieze. (See M. Plate XL.)

Winds, Tower of the. A horologium or water clock erected at Athens by Andronicus Cyrrhestes in the 1st Century B. C. It was octagonal in plan, and very ornate, being surmounted by a bronze triton serving as a weather-vane. (See Figs. 72 and 74.)

Z

Zeus (zūs). Supreme god of mythology, to whom many temples were erected, the principal one being that at Olympia. Identified with the Roman Jupiter.

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